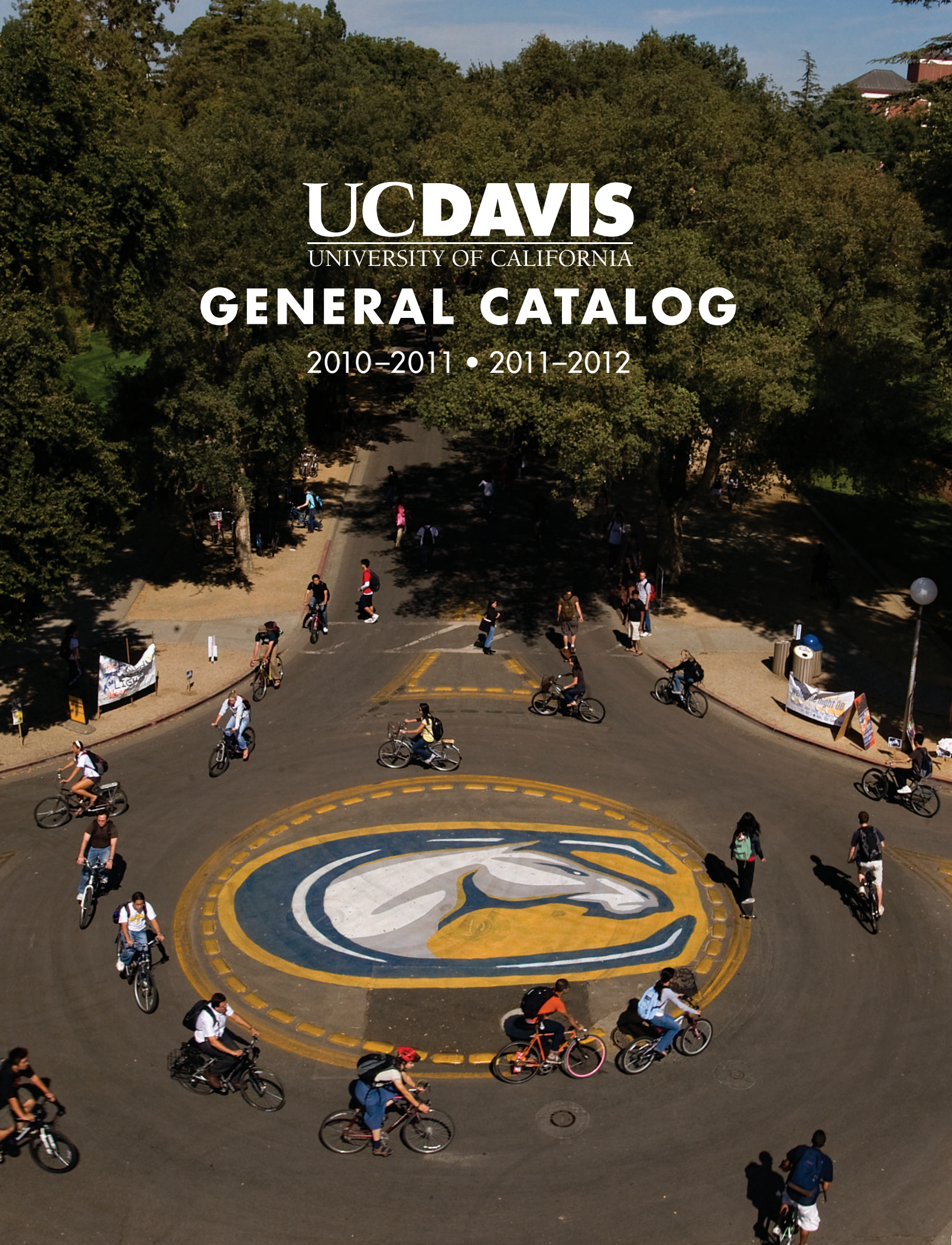

UCDAVIS
UNIVERSITY OF CALIFORNIA

GENERAL CATALOG

2010–2011 • 2011–2012

UC Davis Academic Calendar 2010–2012*

	Fall 2010	Winter 2011	Spring 2011	Fall 2011	Winter 2012	Spring 2012
Class Schedule and Registration Guide and Registration appointment times available	May 3	Nov 1	Jan 31	May 2	Oct 31	Feb 6
Pass 1 Registration (assigned appointments) Pass 2 Registration (assigned appointments)	May 10 Aug 23	Nov 8 Nov 29	Feb 7 Feb 28	May 9 Aug 22	Nov 7 Nov 28	Feb 13 Mar 5
Last day to: • Pay fees to avoid classes being dropped. Students with an unpaid balance will be dropped from classes. • Petition for classification to resident status	Sep 16	Dec 28	Mar 21	Sep 15	Jan 3	Mar 26
Quarter begins	**Sep 20**	**Jan 3**	**Mar 24**	**Sep 19**	**Jan 6**	**Mar 29**
Instructional Startup Activities	Sep 20–22	Jan 3	Mar 24	Sep 19–21	Jan 6	Mar 29
Instruction begins • Last day to file for PELP	**Sep 23**	**Jan 3**	**Mar 28**	**Sep 22**	**Jan 9**	**Apr 2**
Last day to: • Make final late payment of registration fees with penalty • Drop 10-day-drop courses • Change student status (part-time/full-time)	Oct 6	Jan 14	Apr 8	Oct 5	Jan 23	Apr 13
Last day to add courses	Oct 8	Jan 19	Apr 12	Oct 7	Jan 25	Apr 17
Last day to drop 20-day-drop courses	Oct 20	Jan 31	Apr 22	Oct 19	Feb 6	Apr 27
Last day to: • Opt to take courses on a P/NP basis • File to take courses on a S/U basis	Oct 27	Feb 7	Apr 29	Oct 26	Feb 13	May 4
Instruction ends	**Dec 3**	**Mar 14**	**Jun 2**	**Dec 2**	**Mar 19**	**Jun 7**
Final examinations	Dec 6–10	Mar 15–19	Jun 4, 6–9	Dec 5–9	Mar 20–24	Jun 9, 11–14
Quarter ends	**Dec 10**	**Mar 19**	**Jun 9**	**Dec 9**	**Mar 24**	**Jun 14**
Commencement	Dec 11	——–	Jun 10–12	Dec 10	——–	Jun 15-17
Academic and Administrative Holidays	Nov 11 Nov 25–26 Dec 24 & 27 Dec 30–31	Jan 17 Feb 21	Mar 25 May 30	Nov 11 Nov 24–25 Dec 26–27 Dec 30 & Jan 2	Jan 16 Feb 20	Mar 30 May 28
Filing for Candidacy (Graduation)						
Filing period for those who expect to complete work for a bachelor's degree to file for candidacy with the Registrar †	Jun 1–Oct 6	Nov 8–Jan 14	Feb 1–Apr 8	Jun 1–Oct 5	Nov 7–Jan 23	Feb 1–Apr 13
Last day to file minor with the Dean's Office ‡	Oct 6	Jan 14	Apr 8	Oct 5	Jan 23	Apr 13
Undergraduate Admission						
Last day for applicants to file admission & scholarship application	Nov 30, 2009	Jul 30, 2010	Oct 29, 2010	Nov 30, 2010	Jul 29, 2011	Oct 31, 2011
Last day to file readmission application with the Registrar for returning undergraduate status	Jul 30, 2010	Oct 31, 2010	Jan 31, 2011	Jul 31, 2011	Oct 30, 2011	Jan 31, 2012

Summer Sessions 2011

Jun 20–Jul 29

Aug 1–Sep 9

Summer Sessions 2012

Jun 25–Aug 3

Aug 6–Sep 14

Financial Aid Filing Period

- Filing period for grants, loans, work-study and California Student Aid awards for 2011–2012; Jan 1–Mar 2
- Filing period for undergraduate scholarship application for 2011–2012: Oct 3–Dec 3, 20010

Key to Symbols

* **Dates are subject to change;** check the appropriate *Class Schedule and Registration Guide.*

† For students graduating Sep 2011, the filing period is May 17–Jul 8.

‡ For students graduating Sep 2011, the deadline to file a minor program with Dean's Office is Jul 8.

UC DAVIS
UNIVERSITY OF CALIFORNIA

GENERAL CATALOG

2010–2011 • 2011–2012

UCDAVIS

June 2010 Volume 45

Published by

Office of the University Registrar
University of California
One Shields Avenue
Davis, CA 95616-8692

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IT IS THE RESPONSIBILITY OF THE INDIVIDUAL STUDENT TO BECOME FAMILIAR WITH THE ANNOUNCEMENTS AND REGULATIONS OF THE UNIVERSITY PRINTED IN THIS GENERAL CATALOG AND IN THE CLASS SCHEDULE AND REGISTRATION GUIDE (CSRG).

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

The *General Catalog* may be purchased from:
UC Davis Bookstore
University of California, Davis
2828 Cowell Blvd., Davis, CA 95616-4902
(530) 752-2944
http://bookstore.ucdavis.edu/

Credits

Editorial and production coordination:
Randall Larson-Maynard, Office of the University Registrar

Cover design:
Lisa Wells, Editorial/Design, Office of Public Communications

Photography (unless otherwise noted):
Mediaworks

Supplemental Major and Course Information

The provisions of this catalog reflect information as of the date of publication. The most current information available to the Office of the University Registrar may be found in the *Class Schedule and Registration Guide (CSRG)*.

All new/changed/cancelled *General Catalog* course and program listings are published exclusively in the *General Catalog Supplement*. You can find the *2010-2012 General Catalog Supplement* at *http://registrar.ucdavis.edu/UCDWebCatalog/*.

FROM THE CHANCELLOR

Welcome to UC Davis. We're delighted you've chosen our campus as the place to pursue your academic goals. All of us—faculty, staff and alumni—are committed to helping you toward their successful attainment.

In the time you spend at UC Davis, you will acquire knowledge and skills that will help you shape the rest of your life. In whatever program you study, you will receive an exceptional education and a degree that is respected by graduate schools and employers around the world. Our philosophy of learning, discovery and engagement means that you will graduate with an academic foundation strengthened by research and internships. It also ensures that you will understand how your learning is relevant to the greater world. UC Davis has a century of commitment to public service and seeking solutions to today's critical issues, and we encourage you to integrate these goals into your educational plan.

Students who get involved love UC Davis! While you're here, you'll make lifelong friends and have experiences that will determine the direction of your growth as a human being and as a member of the larger community in which you live. It's your passion and vision that energize and inspire the campus and make your time here meaningful.

We are very proud of UC Davis. Our alumni have made significant and lasting contributions to society as leaders in government, business, technology, media and the arts. They share their knowledge and resources with the campus and help students build social and career networks before they graduate. Members of our faculty have won MacArthur genius grants, Pulitzer prizes, Fulbright scholarships and election to the nation's top academies of the arts and sciences. They connect to students in the classroom, through freshman seminars and through research, arts and honors activities.

UC Davis continues to grow and offer new opportunities. Residence halls and dining facilities, a multipurpose stadium, new math and sciences buildings and the Mondavi Center for the Performing Arts are a few of the developments that reflect our commitment to offering the best educational experience available.

Together, we are using our talents and ingenuity to build a community that honors our diversity as individuals and reflects our belief in a shared set of values. I'm happy you're joining our community.

Congratulations on becoming an Aggie!

Linda Katehi
Chancellor

ADDRESS DIRECTORY

University of California
One Shields Avenue
Davis, California 95616
(530) 752-1011; main campus number
http://www.ucdavis.edu

Visitor Services Office

Buehler Alumni and Visitors Center
(530) 752-8111
(Campus tours, maps and information)

Campus Information Center

Memorial Union
(530) 752-2222

Offices of the Chancellor and Provost

Fifth Floor, Mrak Hall
(530) 752-2065

College of Agricultural and Environmental Sciences

150 Mrak Hall
(530) 752-0108

College of Biological Sciences

202 Life Sciences
(530) 752-0410

College of Engineering

1050 Kemper Hall
(530) 752-0553

College of Letters and Science

200 Social Sciences and Humanities Building
(530) 752-0394
Academic Counseling: (530) 752-0392

Graduate Studies

250 Mrak Hall
(530) 752-0650

Graduate School of Management

Gallagher Hall
(530) 752-8658

School of Law

King Hall
(530) 752-0243

School of Medicine

4610 X Street, Sacramento
(916) 734-7131

School of Veterinary Medicine

Surge IV
(530) 752-1360

Office of Summer Sessions

1350 Surge III
(530) 752-7622

University Extension

1333 Research Park Drive
(530) 757-8777

News Service

334 Mrak Hall
(530) 752-1930

Legal Analyst—Residence Matters

University of California Office of the President
1111 Franklin Street, 8th Floor
Oakland, CA 94607-5206

Admissions

Undergraduate	Undergraduate Admissions 178 Mrak Hall (530) 752-2971
	Education Outreach Program (EOP) Office of Admissions 175 Mrak Hall (530) 752-2971
Graduate	Office of Graduate Studies Admissions 252 250 Mrak Hall (530) 752-0655
Law	School of Law Admissions 115 King Hall (530) 752-6477
Management	Graduate School of Management Admissions Gallagher Hall (530) 752-7658
Medicine	School of Medicine Admissions and Outreach 4610 X St., Sacramento 126 Medical Sciences 1-C (916) 734-4110
Veterinary Medicine	School of Veterinary Medicine Admissions 114 Haring Annex (530) 752-1383

Office of the University Registrar

12 Mrak Hall
(530) 752-3639
TDD: (530) 752-5149

Financial Aid Office

Dutton Hall
Undergraduate: (530) 752-2390
Graduate: (530) 752-9246
Student Employment: (530) 752-0520

Undergraduate Scholarship Office

Dutton Hall
(530) 752-2804

Fellowships and Graduate Scholarships

Graduate Studies
Dutton Hall
(530) 752-7481

Teaching and Research Assistantships

Write to department or group concerned.

Associated Students of the University of California, Davis (ASUCD)

347 Memorial Union
(530) 752-1990

Student Disability Center

160 South Silo
(530) 752-3184
TTY: (530) 752-6833

Student Health Service

Student Health & Wellness Center
(530) 752-2300

Student Housing Office

160 Student Housing
(530) 752-2033

CONTENTS

DEGREES OFFERED BY UC DAVIS

Undergraduate majors are administered by the colleges of Agricultural and Environmental Sciences (A&ES), Biological Sciences (CBS), Letters and Science (L&S), Engineering, and the UC Davis Extension (UNEX). Professional studies are administered by the schools indicated. All graduate programs are administered by the Office of Graduate Studies. The list below indicates the major or discipline, the degree(s) offered and the school or college offering the major.

Degrees offered: A.B.–Bachelor of Arts, B.S.–Bachelor of Science, Certificate, M.A.–Master of Arts, M.A.M.–Master of Agricultural Management, M.A.S.–Master of Advanced Studies, M.A.T.–Master of Arts in Teaching, M.B.A.–Master of Business Administration, M.Ed.–Master of Education, M.Engr–Master of Engineering, M.F.A.–Master of Fine Arts, M.P.H.–Master of Public Health, M.P.V.M.–Master of Preventive Veterinary Medicine, M.S.–Master of Science, Ed.D.–Doctorate in Education, D. Engr.–Doctor of Engineering, Ph.D.–Doctor of Philosophy, J.D.–Doctor of Law, LL.M.–Master of Laws, M.D.–Doctor of Medicine, D.V.M.–Doctor of Veterinary Medicine.
* = closed to new students, † = graduate degree offered under Engineering, **Master's degree offered only en route to Ph.D.

Aerospace Science and Engineering
B.S.† . . . . . Engineering

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

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

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

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

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

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

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

Animal Science
B.S. . . . . A&ES

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

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

Applied Mathematics
B.S . . . . . L&S

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

Applied Science Engineering
M.S., Ph.D. . . . . Engineering

Applied Physics
B.S. . . . . L&S

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

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

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

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

Avian Sciences
B.S., M.S. . . . . A&ES

Biochemical Engineering
B.S. . . . . Engineering

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

Biochemistry and Molecular Biology
B.S. . . . . CBS

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

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

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

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

Biostatistics
M.S., Ph.D.

Biotechnology
B.S. . . . . A&ES

Cell Biology
B.S. . . . . CBS

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

Chemical Engineering/Materials Science and Engineering
B.S. . . . . Engineering

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

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

Child Development
M.S. . . . . A&ES

Chinese
A.B. . . . . L&S

Civil and Environmental Engineering
M.S., M.Engr., Ph.D., D.Engr., Certificate

Civil Engineering
B.S. . . . . Engineering

Classical Civilization
A.B. . . . . L&S

Clinical Nutrition
B.S. . . . . A&ES

Clinical Research
M.A.S. . . . . School of Medicine

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

Community and Regional Development
B.S. . . . . A&ES

Community Development
M.S. . . . . A&ES

Comparative Literature
A.B., M.A., Ph.D. . . . . L&S

Comparative Pathology
M.S., Ph.D. . . . . School of Veterinary Medicine

Computational Applied Science
B.S. . . . . Engineering

Computer Engineering
B.S.† . . . . . Engineering

Computer Science
B.S. . . . . L&S

Computer Science
M.S., Ph.D. . . . . Engineering

Computer Science and Engineering
B.S. . . . . Engineering

Cultural Studies
M.A., Ph.D. . . . . L&S

Design
A.B., M.F.A. . . . . L&S

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

East Asian Studies
A.B. . . . . L&S

Ecological Management and Restoration
B.S. . . . . A&ES

Ecology
M.S., Ph.D. . . . . A&ES

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

Education
M.A., Ph.D., Ed.D., Credential . . . School of Education

Electrical and Computer Engineering
M.S., Ph.D. . . . . Engineering

Electrical Engineering
B.S.† . . . . . Engineering

Electronic Materials Engineering
B.S. . . . . Engineering

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

Entomology
B.S., M.S., Ph.D. . . . . A&ES

Environmental Horticulture and Urban Forestry
B.S. . . . . A&ES

Environmental Policy Analysis and Planning
B.S. . . . . A&ES

Environmental Science and Management
B.S. . . . . A&ES

Environmental Toxicology
B.S. . . . . A&ES

Epidemiology
M.S., Ph.D. . . . . School of Veterinary Medicine

Evolution, Ecology, and Biodiversity
A.B. or B.S. . . . . CBS

Exercise Biology
A.B. or B.S. . . . . CBS

Exercise Science
M.S.

Family Nurse Practitioner/Physician Assistant
Credential. . . . . School of Medicine

Fiber and Polymer Science
B.S. . . . . A&ES

Film Studies
A.B. . . . . L&S

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

Forensic Science
M.S. . . . . UNEX

French
A.B., Ph.D. . . . . L&S

Genetics
B.S., M.S., Ph.D. . . . . CBS

Geography
M.A.*, Ph.D.* . . . . . A&ES

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

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

Graduate School of Management
M.B.A. . . . . Graduate School of Management

Health Informatics
M.S. . . . . School of Medicine

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

Horticulture & Agronomy
M.S., Ph.D . . . . . A&ES

Human Development
B.S., Ph.D. . . . . A&ES

Hydrologic Sciences
M.S., Ph.D. . . . . A&ES

Hydrology
B.S. . . . . A&ES

Immunology
M.S., Ph.D. . . . . School of Veterinary Medicine

Individual Major
A.B., B.S. . . . . A&ES, CBS or L&S

International Agricultural Development
B.S., M.S. . . . . A&ES

International Commercial Law
L.L.M. . . . . School of Law

International Relations
A.B. . . . . L&S

Italian
A.B. . . . . L&S

Japanese
A.B. . . . . L&S

Landscape Architecture
B.S. . . . . A&ES

Law
J.D., LL.M. . . . . School of Law

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

Managerial Economics
B.S. . . . . A&ES

Master of Laws
L.L.M. . . . . School of Law

Master of Public Health
M.P.H. . . . . School of Medicine

Materials Science and Engineering
B.S., M.S., M.Engr., Ph.D. . . . Engineering

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

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

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

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

Mechanical Engineering
B.S.† . . . . . Engineering

Mechanical Engineering/Materials Science and Engineering
B.S. . . . . Engineering

Medicine
M.D. . . . . School of Medicine

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

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

Microbiology
A.B. or B.S., M.S.**, Ph.D. . . . . CBS

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

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

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

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

Nature and Culture
A.B. . . . . L&S

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

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

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

Nutrition Science
B.S. . . . . A&ES

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

Optical Science and Engineering
B.S. . . . . Engineering

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

Pharmacology and Toxicology
M.S.**, Ph.D. . . . . School of Veterinary Medicine

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

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

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

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

Plant Sciences
B.S. . . . . A&ES

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

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

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

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

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

Religious Studies
A.B. . . . . L&S

Russian
A.B. . . . . L&S

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

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

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

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

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

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

Technocultural Studies
A.B . . . . . L&S

Textiles
M.S. . . . . A&ES

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

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

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

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

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

Women's Studies
A.B. . . . . L&S

MINOR PROGRAMS OFFERED BY UC DAVIS

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

African American and African Studies .... L&S
Aging and Adult Development (Human & Community Development) ..... A&ES
Agricultural Pest Management ..... A&ES
Agricultural Systems and Environment (Plant Sciences) ..... A&ES
American Studies ..... L&S
Animal Science—Animal Biology ..... A&ES
Animal Science—Animal Genetics ..... A&ES
Animal Science—Aquaculture ..... A&ES
Animal Science—Dairy/Livestock ..... A&ES
Animal Science—Equine ..... A&ES
Anthropology ..... L&S
Applied Biological Systems Technology (Biological & Agricultural Engineering) .. A&ES
Applied Computing & Information Systems (Plant Sciences) ..... A&ES
Art History ..... L&S
Art Studio ..... L&S
Asian American Studies ..... L&S
Atmospheric Science (Land, Air, and Water Resources) ..... A&ES
Avian Sciences (Animal Science) ..... A&ES
Biological Sciences ..... CBS
Chemistry ..... L&S
Chicana/Chicano Studies ..... L&S
Chinese (East Asian Languages and Cultures) ..... L&S
Classical Civilization (Classics) ..... L&S
Communication ..... L&S
Community Development (Human & Community Development) .. A&ES
Community Nutrition (Nutrition) ..... A&ES
Comparative Literature ..... L&S
Computer Science ..... L&S
Construction Engineering and Management (Civil Engineering) ..... ENGR
Contemporary Leadership ..... A&ES
Dramatic Art (Theatre and Dance) ..... L&S
East Asian Studies ..... L&S
Economics ..... L&S
Education ..... SOE
Energy Science & Technology (Biological and Agricultural Engineering) ..... ENGR
Energy Policy ..... ENGR
English ..... L&S
Environmental Geology (Geology) ..... L&S
Environmental Horticulture (Plant Sciences) ..... A&ES
Environmental Policy Analysis (Environmental Science and Policy) .... A&ES
Environmental Toxicology ..... A&ES
Evolution, Ecology and Biodiversity ..... CBS
Exercise Biology (Neurobiology, Physiology, and Behavior) ..... CBS
Expository Writing (University Writing Program) ..... L&S
Fiber and Polymer Science (Textiles and Clothing) ..... A&ES
Film Studies ..... L&S
Food Service Management (Nutrition) .. A&ES
Forensic Entomology (Entomology) .... A&ES
French ..... L&S
Fungal Biology and Ecology (Plant Pathology) ..... A&ES
Geographic Information Systems (Biological & Agricultural Engineering) ..... A&ES
Geographic Studies (Environmental Design) ..... A&ES
Geology ..... L&S
Geophysics (Geology) ..... L&S
German ..... L&S
Global and International Studies (Humanities) ..... L&S
Greek (Classics) ..... L&S
History ..... L&S
History and Philosophy of Science (Science & Technology Studies) ..... L&S
Human Development (Human & Community Development) ..... A&ES
Human Physiology (Neurobiology, Physiology, and Behavior) ..... CBS
Hydrology (Land, Air, and Water Resources) ..... A&ES
Insect Biology (Entomology) ..... A&ES
Insect Ecology and Evolution (Entomology) ..... A&ES
International Agricultural Development (Human & Community Development) .. A&ES
International Science Studies (Land, Air, and Water Resources) ..... A&ES
Italian ..... L&S
Japanese (East Asian Languages and Cultures) ..... L&S
Jewish Studies (Humanities) ..... L&S
Landscape Restoration (Plant Sciences) .. A&ES
Latin (Classics) ..... L&S
Latin American and Hemispheric Studies .. L&S
Linguistics ..... L&S
Linguistics for Language Teachers ..... L&S
Luso-Brazilian Studies (Spanish) ..... L&S
Managerial Economics (Agricultural and Resource Economics) ..... A&ES
Mathematics ..... L&S
Medical–Veterinary Entomology (Entomology) ..... A&ES
Medieval and Early Modern Studies ..... L&S
Middle East/South Asia Studies ..... L&S
Music ..... L&S
Native American Studies ..... L&S
Nematology ..... A&ES
Neuroscience (Neurobiology, Physiology, and Behavior) ..... CBS
Nutrition and Food (Nutrition) ..... A&ES
Nutrition Science (Nutrition) ..... A&ES
Oceanography (Geology) ..... L&S
Philosophy ..... L&S
Physics ..... L&S
Plant Biology ..... CBS
Political Science ..... L&S
Precision Agriculture (Biological and Agricultural Engineering) ..... A&ES
Psychology ..... L&S
Optical Science & Engineering ..... ENGR
Quantitative Biology and Bioinformatics (Biological Sciences) ..... CBS
Religious Studies ..... L&S
Russian ..... L&S
Science and Society ..... A&ES
Sexuality Studies ..... L&S
Social and Ethnic Relations (African American and African Studies, Asian American Studies, Native American Studies, Women and Gender Studies) ..... L&S
Sociology ..... L&S
Soil Science (Land, Air, and Water Resources) ..... A&ES
Spanish ..... L&S
Statistics ..... L&S
Technology Management ..... GSM
Textiles and Clothing ..... A&ES
War–Peace Studies (International Relations) ..... L&S
Watershed Science (Land, Air, and Water Resources) ..... A&ES
Wildlife, Fish and Conservation Biology .. A&ES
Women's Studies ..... L&S

INTRODUCTION

INTRODUCTION

Welcome to UC Davis. Founded as the University Farm amid the fertile fields of the state's Central Valley, UC Davis initially emerged as an acknowledged international leader in agricultural, biological, biotechnological and environmental sciences and has now gained similar recognition for excellence in the arts, humanities, social sciences, engineering, education, health sciences, law and management. *U.S. News & World Report* ranks UC Davis 11th among public universities nationally and the campus is among a select group admitted into the prestigious Association of American Universities. Membership in this group of 62 institutions of higher learning is by invitation only.

The campus owes much of its strength to its deep traditional roots in agriculture and the impressive diversity of academic programs that emerged from this foundation. A distinguished faculty of scholars and scientists, a treasured sense of community and a dedication to the land-grant values of creative, responsive and innovative teaching, research and public service are hallmarks of UC Davis, as is interdisciplinary collaboration; many faculty hold cross-departmental appointments and students are challenged to explore the relationships between fields of study.

THE UNIVERSITY OF CALIFORNIA

UC Davis is one of 10 campuses of the University of California, which was chartered as a land grant college in 1868 and has become the country's premier system of public higher education. Together, the campuses have an enrollment of more than 200,000 students, with more than 1.4 million alumni living and working around the world. Some 150 laboratories, extension centers, research and field stations strengthen teaching and research while providing public service to California and the nation. The collections of the more than 100 UC campus libraries are surpassed in size in the United States only by that of the Library of Congress.

A Place for Learning

Providing a rich and challenging learning experience for undergraduate and graduate students is critical to UC Davis' mission and is a cherished commitment of the campus. Several programs support this aim, including a $40,000 prize awarded to a faculty member each year by the UC Davis Foundation in recognition of outstanding undergraduate teaching and scholarly achievement and a campuswide Davis Honors Challenge program through which students elect special courses and have closer contact with faculty.

UC Davis offers more than 100 undergraduate majors and 86-plus graduate programs in the College of Agricultural and Environmental Sciences, the College of Biological Sciences, the College of Engineering and the College of Letters and Science. UC Davis' six professional schools—the School of Education, the School of Law, the Graduate School of Management, the School of Medicine, the Betty Irene Moore School of Nursing, and the School of Veterinary Medicine—are a combination unique within the University of California system.

A Place for Discovery

Research is an integral part of teaching at UC Davis. Faculty members share their research findings in the classroom and students learn firsthand about discovery while working with professors in the laboratory and field. A number of undergraduate research programs offer students the opportunity to work on a research project in a faculty laboratory, in some cases as early as their freshman year.

Research at UC Davis supports California's economic, intellectual and social development. The campus's varied research programs explore and seek solutions to today's critical issues in areas such as agriculture, resource management, the environment, health, medicine, engineering, business, the economy and public policy. UC Davis scholars also explore the intellectual frontiers of the physical, biological and social sciences, the humanities and the arts.

The campus's reputation has attracted a distinguished faculty of scholars and scientists in all fields. UC Davis ranks 10th in research funding among public universities in the United States, receiving more than $532 million in 2006-07.

Life in Davis

Life at UC Davis is as diverse as the members of our university community. Students enjoy sports, community internships, public service, outdoor activities, concerts and clubs. And, through running several key campus services and sharing their opinions with leadership, they are integral players in the life of the institution.

In 2007, UC Davis made the transition to Division I of the National Collegiate Athletic Association. UC Davis sponsors 14 varsity sports for women and 9 for men. Club sports, organized by students, compete against other area colleges and amateur clubs are recreational and focus on skill development and social interaction. Intramural sports annually draw more than 19,000 students who participate in more than 50 different men's, women's and coed activities.

Some 70 percent of UC Davis students interested in gaining work experiences participate in internships locally, nationally and globally through the campus's Internship and Career Center, among the largest campuswide academic internship programs in the country. UC Davis is known for its student-run facilities; the Coffee House, the radio station KDVS and the Unitrans bus service provide paid employment and real-world experience to hundreds of students each year.

A cultural center in the region, the Robert and Margrit Mondavi Center for the Performing Arts features internationally known artists and speakers and showcases offerings of the university's music and theatre and dance departments. Museums and galleries—all 10 of them—house valuable teaching, research and general interest collections that range from the Bohart Museum of Entomology's insects to contemporary Native American art at the C.N. Gorman Museum.

Through the Campus Community Book Project, faculty, students and staff each year read a book that challenges their own assumptions as a way to create a better sense of community. Cultural days held each spring celebrate Native American, Asian, African American, Mixed Heritage, Hispanic and Latino Heritage.

A city of more than 65,000 people, Davis is known as an environmentally aware, physically fit and socially innovative community. The city was named best bicycle community in the U.S. by the League of American Bicyclists (the only city ever to receive platinum recognition) and has more than 103 miles of dedicated bike lanes and paths and nearly 500 acres of parks and greenbelts. Davis' proximity to Sacramento, the state's capital, to Lake Tahoe and to the San Francisco Bay Area makes it easy to take advantage

of big-city attractions while enjoying the lifestyle of a university town.

Davis offers high-performing K-12 schools, cultural amenities for a variety of tastes and plentiful recreational activities. A twice-weekly farmers market offers a variety of locally grown produce, flowers and fresh-baked goods.

VISITING THE CAMPUS

Visitor Services Office
Buehler Alumni and Visitors Center
(530) 752-8111; *http://www.visit.ucdavis.edu/*

Saturday tours depart from the Buehler Alumni and Visitors Center at 11:30 a.m. Campus is closed on Sundays. Weekday tours depart at 10 a.m. and 2 p.m. Register for tours one week in advance by calling (530) 752-8111 or at *http://visit.ucdavis.edu*. If you have questions about application procedures or entrance requirements, write or visit Undergraduate Admissions in 178 Mrak Hall.

THE UNDERGRADUATE COLLEGES

The College of Agricultural and Environmental Sciences

College Office
150 Mrak Hall
(530) 752-0108; *http://www.caes.ucdavis.edu*

The College of Agricultural and Environmental Sciences offers a diverse program of majors and courses and is committed to education that emphasizes a spirit of discovery. Based on the premise that tomorrow's citizens will need to anticipate, understand and solve emerging societal problems and contribute to the discovery and application of new knowledge, the college fosters:

- Critical thinking and an appreciation for diversity in thought and approaches to problem solving
- An ethos of lifelong learning—of teaching oneself and others while confronting challenges and solving problems
- An ability to move beyond either/or thinking and to pursue innovative and integrative understanding of the agricultural sciences, environmental sciences and human sciences
- Intellectual skills that prepare individuals to secure a life-affirming physical and cultural environment based on sound, respectful management of resources
- A commitment to serve the public with informed and open-minded dedication to understanding, critiquing and addressing complex societal needs and interests

The college is proud of its rich agricultural history. From this foundation, it has expanded its educational offerings to encompass programs that highlight interconnections among the environment, plant and animal sciences, biological sciences and human sciences. Through a wide array of major programs, the college prepares high-potential students for advanced studies in diverse disciplines and leadership in such arenas as public policy; research and development; managerial and natural resource economics; agricultural systems; environmental protection, safety and design; human nutrition, health and development; and the food, fiber, textile and apparel industries.

Undergraduate students enjoy early contact with faculty advisers, graduate students and postgraduate researchers, enriching and broadening the educational experience of all.

Several levels of academic advising are available that are designed to enhance your undergraduate experience. Advisers help you plan your courses, meet degree requirements and take maximum advantage of the resources available at UC Davis. You are encouraged to meet regularly with your assigned faculty adviser and with the Advising Associates and departmental peer advisers. Through a shared commitment to education for service to society, college faculty, staff and students work together to improve the relationship between humanity and the natural world.

The College of Biological Sciences

Dean's Office
202 Life Sciences
(530) 752-0410; *http://biosci.ucdavis.edu*

The mission of the College of Biological Sciences is to prepare students to fully engage and actively participate in all areas of the exciting and rapidly expanding field of biology. Courses offered by the college span the basic biological disciplines of biochemistry, behavior, cell biology, evolution, ecology, genetics, physiology and neurobiology and apply these concepts to the study of microbes, plants and animals ranging from genetic model organisms to humans. Recent additions to the curriculum, including courses in genomics, bioinformatics and computational biology, reflect the profound changes sweeping biology as new technologies enable new areas of research.

Coursework in the college's majors is rich in hands-on laboratory instruction as well as lectures and seminars. Every department in the College offers laboratory courses in the Sciences Laboratory Building—a state-of-the-art facility featuring advanced instrumentation and a student-friendly environment. In addition, many students in the college participate in laboratory research and internships that enable them to bridge classroom experiences to life beyond the university.

Biology is integral to a multitude of career options. Whether interested in a professional career in the health sciences, a career in research in education, environmental work or pharmaceutical sales, students in the College of Biological Sciences receive the attention and preparation they need to excel in their chosen field.

To learn more about the nine majors offered through the College of Biological Sciences, see our website at *http://biosci.ucdavis.edu*, select *Undergraduate Students*, and then select *Majors & Minors*.

University of California, Davis

Principles of Community

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

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

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

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

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

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

Mission Statement:

Philosophy of Purpose

The central purpose of UC Davis, as a comprehensive research university, is the generation, advancement, dissemination and application of knowledge. In this, UC Davis is committed to developing and sustaining leading programs in

- The arts, humanities, biological and physical sciences and social sciences—disciplines at the core of all universities;
- Agricultural and environmental disciplines and engineering;
- Professional studies in education, law, management, medicine and veterinary medicine.

In these programs, the campus integrates three purposes: teaching students as a partnership between faculty mentors and young scholars; advancing knowledge and pioneering studies through creative research and scholarship; and applying that knowledge to address the needs of the region, state, nation and globe. UC Davis is committed to the tradition of the land-grant university, the basis of its founding. This tradition—built on the premise that the broad purpose of a university is service to people and society—guides today the campus's special commitments and emphases.

UC Davis has a history of focused attention on undergraduate education. The central elements of a liberal education—the arts and languages, history and philosophy and the sciences—offer the opportunity for a broad general education combined with specialization in a scholarly discipline. Coupled with this are manifold opportunities for personal development through programs for academic enrichment, including undergraduate research, work-learn experiences and extracurricular student life.

Dedicated to scholarship, the furtherance of knowledge and the education of graduate students who will advance the next generations of research, UC Davis offers a diverse array of post-baccalaureate programs. Drawing upon the wide range of specialized academic fields, stimulating cross-disciplinary approaches, and using its distinctive graduate groups, a structure that permits students to pursue lines of inquiry that cross traditional disciplinary lines, UC Davis continues to follow and redefine the mandate of a major research university.

The campus has a commitment to advancing teaching and scholarly work in the arts, humanities and the social sciences, studies that also enrich the life of each person and society as a whole. Infusing the pursuit of careers in education, law, management and medicine with these insights and values is also emphasized.

Because of its prominence in the biological, physical and engineering sciences—and building on its distinguished programs in the agricultural and environmental sciences—UC Davis plays a leadership role in modern biology, focusing its strength on basic research and related studies in agriculture, human and animal health and the environment. Consonant with this emphasis is UC Davis' enhancement of its strength in the engineering and physical sciences, reflecting the importance of these disciplines for the economic vitality of California and the nation.

The life of UC Davis extends beyond teaching and study to service to the region, state, nation and the world. This is given in many forms: cooperative extension to agriculture and education; medical services to central California and beyond through the multifaceted UC Davis Health System in Sacramento; diverse educational programs of UC Davis Extension that share knowledge with the region; voluntary contributions of faculty, staff and students; and athletic and cultural programs for the campus and community at large. UC Davis is surrounded by vibrant, local communities and its proximity to Sacramento, the state capital, gives this outreach urgency and opportunity. Collaborative studies and cooperation between UC Davis and state agencies and the Legislature are both a special responsibility and a unique opportunity

UC Davis is characterized by a distinguished faculty, a dedicated and high-achieving staff and students of great potential and accomplishment. As we move forward, we recognize that our continued excellence is dependent upon our ability to diversify our university community, consonant with the citizenry of California.

UC Davis remains committed to its human values: caring and personal relationships, collaborative and thoughtful work, all within a human-scale environment. These special qualities are sustained by intellectual strength within a collegial community whose members share a deep desire for teaching and learning, for an abiding commitment to discovering and applying new knowledge.

Educational Objectives for Students

- Develop effective communication skills:

  Written, oral, interpersonal, group

- Develop higher cognitive skills:

  Critical thinking, creativity, analytical ability

- Cultivate the virtues:

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

- Develop focus and depth in one or more disciplines

- Develop leadership skills:

  Ability to stimulate and direct collaborative learning and collaborative action

- Develop a global perspective:

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

- Prepare for lifelong learning:

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

The College of Engineering

Dean's Office
1050 Kemper Hall
(530) 752-1979; *http://engineering.ucdavis.edu*

The College of Engineering at UC Davis is among the top engineering colleges in the nation.

With a strong record of academic excellence, a rich tradition of interdisciplinary research and a diverse and distinguished faculty, the College's undergraduate program has earned a place among our nation's top twenty public undergraduate colleges of engineering and among the top forty public university graduate engineering programs.

With an enrollment of 3,100 undergraduates and 1,100 graduate students, the College is one of the largest undergraduate engineering colleges in the University of California system.

We have 217 engineering faculty, with 16 current and emeriti members named to the National Academies of Engineering, Science and Medicine.

Our eight departments offer the greatest number of ABET accredited majors (12) in the University of California system.

The Engineering Accreditation Commission of ABET (111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700) accredits the following programs:

- Aeronautical Science and Engineering
- Biochemical Engineering
- Biological Systems Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Electronic Materials Engineering
- Materials Science and Engineering
- Mechanical Engineering
- Optical Science and Engineering

The Engineering Accreditation Commission and the Computing Accreditation Commission of ABET accredit the following program:

- Computer Science and Engineering

The following programs are not accredited by a Commission of ABET:

- Aerospace Science and Engineering
- Biomedical Engineering
- Computational Applied Science
- Chemical Engineering/Materials Science and Engineering
- Civil Engineering/Materials Science and Engineering
- Mechanical Engineering/Materials Science and Engineering

The College maintains a long-standing commitment to undergraduate students, preparing them to contribute to the engineering professions as well as ongoing engineering research. To that end, our academic programs balance the fundamentals of engineering theory with practice, visionary research with practical application—preparing students for entry into engineering practice and graduate-level research.

Undergraduate research experiences and mentoring services smooth the transition from undergraduate to graduate study at UC Davis. Undergraduates are able to intersect with faculty and graduate students from ten (10) graduate engineering programs as well as researchers from a broad spectrum of disciplines university-wide. Award-winning faculty researchers strive to develop more effective, real world solutions to society's most complex problems in the uniquely friendly, open society of collaborative, cross-disciplinary and rigorous scholarship for which UC Davis is widely known. Undergraduates have opportunities to be contributing members of this rich learning environment.

In the proud tradition of America's great land-grant research universities, the UC Davis College of Engineering integrates teaching, research and service to society. While advancing the leading edge of engineering knowledge, the College trains the next generation of engineers who will make a difference in our world.

The Department of Applied Science instructs students in broad areas of scientific technology and offers an innovative program for undergraduates in optical science and engineering and computational applied science that prepares students for careers in industry, national research laboratories to pursue graduate work leading to advanced degrees.

The Department of Biological and Agricultural Engineering combines study in engineering with instruction in the biological sciences to solve challenging environmental and technical problem.

The Department of Biomedical Engineering educates students in a highly interdisciplinary combination of the biological sciences and engineering as this combination applies to medicine.

The Department of Chemical Engineering and Materials Science offers curricula integrating knowledge of chemistry, biological sciences or materials science and engineering that enable students to solve problems in both current and future manufacturing technologies or to analyze the structure, properties and behavior of materials.

The Department of Civil and Environmental Engineering educates students to plan and design systems that have a direct impact on health and human productivity and on the quality of human life.

The Department of Computer Science offers programs in all aspects of design and use of computer hardware and software systems. The department also plays a significant service role for programs throughout the campus.

The Department of Electrical and Computer Engineering offers programs in research and education crucial for the continued success of high technology industries in California and the nation, preparing students to design, analyze and use electronic and computer systems effectively.

The Department of Mechanical and Aeronautical Engineering educates students in the design and manufacture of complex engineering systems for transport, industry or energy and to design, manufacture and operate aircraft and aeronautical structures.

Every effort has been made to provide engineering students with the maximum flexibility consistent with rigorous professional education standards. The key to flexibility is academic advising. You are expected to attend the New Student Orientation program, held the summer before your first quarter on campus. New Stu-

dent Orientation sessions can give you the information you need to make your academic experience both rewarding and effective. As an incoming student, you will be given the name and office hours of your departmental staff adviser; you should arrange to meet with your adviser before you register for courses for the first time. Academic and peer advisers in the Undergraduate Advising Office, in 1050 Kemper Hall, supplement departmental advisers.

Undergraduate education in engineering at UC Davis serves as a sound basis for beginning professional practice in engineering design and development, as a preparation for careers in corporate or governmental operations and as a foundation for graduate study. To these ends, the college emphasizes fundamental sciences to give students the maximum postgraduate flexibility. In order to remain relevant in a quickly changing technical world, engineering education must be based on fundamentals or rapidly become obsolete.

Engineers will continue to face new challenges in the race to improve the quality of life for everyone and keep our state and nation competitive in the global marketplace.

As part of one of the nation's 76 land-grant institutions, UC Davis Engineering's mission is to help maintain the United States' technical leadership and advance technology for the benefit of everyone.

The College of Letters and Science

Undergraduate Education and Advising Office
200 Social Sciences and Humanities Building
(530) 752-0392; *http://www.ls.ucdavis.edu*

The College of Letters and Science provides students with the opportunity to actively engage the central academic disciplines of the university. The largest of the four undergraduate colleges at UC Davis, the College of Letters and Science offers the majority of the campus's general education courses, more than 50 major programs of study and thousands of courses per year across a broad range of subject areas. Its nearly 500 faculty members are organized into three Divisions—Humanities, Arts and Cultural Studies; Mathematical and Physical Sciences; and Social Sciences. The college confers Bachelor of Arts (A.B.), Bachelor of Science (B.S.) and Bachelor of Arts and Science (B.A.S.) degrees.

The College of Letters and Science is a community of scholars and students sharing a commitment to liberal education rather than to specialized, vocationally-oriented training. The college exposes you to the worlds of human experience, of ideas, of artistic accomplishments and of matter and things. Within this curriculum you are able to explore a variety of academic fields, engage in the pursuit of fundamental knowledge and gain the capacity for independent study and thought. By learning to think carefully and critically, you will be able to continue the ongoing process of education that begins in the classroom but continues over a lifetime. You will have learned how to learn—the ultimate objective of a liberal arts education.

The educational goals of the college are reflected in the three primary groups of requirements established by the faculty: the English Composition Requirement, the Foreign Language and Area Requirements and the Major Requirements.

The **English Composition Requirement** ensures that you are well versed in written communication skills.

The **Foreign Language and Area Requirements** provide you with a broad background of knowledge, guide you in an exploration of the interdependencies of knowledge and acquaint you with other cultures.

The College of Letters and Science acknowledges the value of language learning and encourages students to acquire proficiency in a foreign language before graduating from UC Davis. The goals of language learning are the following: communicating complex ideas in the target language; acquiring understanding of a variety of cultural perspectives and differences; fostering intercultural communicative competence; gaining access to cultural production from another time and place; enhancing knowledge of other disciplines through the target language; recognizing the nature and structure of languages, including one's own; and developing the capacity to participate actively in multilingual communities both at home and abroad.

The **Major Requirements** provide you with intellectual depth and competence in a selected area of study.

The college has a well-developed system of faculty advisers, professional staff advisers and student peer advisers who are available for individual consultations with undergraduates in a variety of settings, from the college undergraduate education and advising office to departmental offices to campus residence halls.

The strength of the college lies in the faculty's commitment to advancing the frontiers of human knowledge through research, artistic expression and other creative endeavors and to the effective communication and application of that knowledge through teaching and public service. Together, faculty and students in the College of Letters and Science create a climate that enables students to achieve their highest potential.

GRADUATE STUDY

Office of Graduate Studies
250 Mrak Hall
(530) 752-0650; *http://gradstudies.ucdavis.edu*

Graduate students at UC Davis have the opportunity to work with and learn from accomplished faculty, recognized for their contributions to research in their fields. The Office of Graduate Studies oversees over 80 graduate programs leading to master's or doctoral degrees, which together enroll more than 4,000 graduate students. Many graduate programs are offered through graduate groups, an interdisciplinary concept that allows students to study and work in interrelated areas to broaden their intellectual experiences; see Graduate Studies, on page 108.

PROFESSIONAL STUDY

UC Davis has six professional schools-the School of Law (J.D.), the School of Medicine (M.D.), the School of Veterinary Medicine (D.V.M., M.P.V.M.), the School of Education (M.A., Ph.D., Ed.D.), the Betty Irene Moore School of Nursing (M.S., Ph.D.), and the Graduate School of Management (M.B.A.). These schools and programs are described in later chapters.

ACADEMIC RESOURCES

The University Library

(530) 752-6561; *http://www.lib.ucdavis.edu*

The General Library at UC Davis is one of the premier research libraries in North America. In addition to Peter J. Shields Library, there are four other General Library facilities: the Physical Sciences & Engineering Library, the Loren D. Carlson Health Sciences Library, the Agricultural and Resource Economics Library and the Blaisdell Medical Library in Sacramento. The combined collections of the various General Library facilities total more than 3.3 million volumes and more than 38,000 periodical and journal titles are received annually. An extensive variety of government documents, maps, microfilms and other formats are also part of the collection.

Shields Library houses the collections in the humanities, arts, social sciences, biological sciences, agricultural sciences, mathematics and computer science. The Physical Sciences & Engineering Library collections support teaching and research in engineering, chemistry, geology and physics. The Carlson Health Sciences Library serves the Schools of Medicine and Veterinary Medicine and programs in public health. The Blaisdell Medical Library at the UC Davis Medical Center provides a clinical collection of more than 44,000 volumes serving the hospital and clinics as well as the Schools of Nursing and Medicine. The law library, administered by the School of Law, is located in King Hall.

The General Library's HARVEST catalog identifies campus library resources, while the MELVYL online catalog identifies the library collections at UC Davis and the other nine UC campuses. The HARVEST catalog, MELVYL and other electronic resources, including more than 19,000 full-text journals can be searched in the libraries, at campus locations and remotely via the Internet. Workstations with Internet access are available for patron use in all library facilities. A wireless network in Shields Library, the Physical Sciences & Engineering Library, the Carlson Health Sciences Library and the Blaisdell Medical Library connects authorized laptop users to library and campus resources and services.

Information about library services, full text electronic books and journals, and important subject-specific Internet sites are available at the Library's website. The Library provides classes on the use of the HARVEST catalog, MELVYL and subject specific electronic journals and databases. Librarians are available for consultation to effectively and efficiently identify and use information resources for research projects and dissertations.

UC Davis Arboretum

Arboretum Headquarters
(530) 752-4880; *http://arboretum.ucdavis.edu*

The 95-acre UC Davis Arboretum is a living museum with a documented collection of more than 22,000 trees, shrubs and perennials from Mediterranean-climate areas throughout the world, displayed in a series of gardens along Putah Creek's historic north fork. The Arboretum has winding paths for walkers, joggers, or bicyclists, benches where visitors can sit and enjoy the view, and picnic tables for casual gatherings. Demonstration gardens of drought-tolerant flowering perennials and collections of oaks, acacias, conifers, and eucalyptus, along with trees native to the site, are resources for teaching and research. Outstanding plant collections include Shields Oak Grove, Mary Wattis Brown Garden of California native plants, Ruth Risdon Storer Garden: A Valley-Wise Garden, T. Elliot Weier Redwood Grove, and Arboretum Terrace home demonstration garden. Arboretum education programs promote sustainable and environmentally-appropriate gardening practices. Internships are available in nursery management, landscape design and maintenance, environmental education, Integrated Pest Management (IPM) and Geographic Information Systems (GIS).

Information and Educational Technology

IT Express
182 Shields Library
(530) 754-HELP (4357); *ithelp@ucdavis.edu*

Information and Educational Technology (IET) provides a wide range of services and support to undergraduate and graduate students. For more information, and to access those services, see the online Student Computing Guide at *http://studentcomputing.ucdavis.edu/*.

Taking Care of Business Online

- Enroll in classes, add or drop courses, view and print your class schedule
- Access course grades
- View and print your unofficial academic record
- Check balances, view bills, make payments, and manage your student account
- Apply for and view financial aid awards
- Chart and plan your degree; see *http://sisweb.ucdavis.edu/*
- Make campus bookstore purchases; see *http://bookstore.ucdavis.edu/*

Learning and Teaching with Technology

- **Manage coursework and collaborate online with SmartSite.** You'll be able to communicate online with your instructors and fellow students; collaborate on papers and projects; manage your assignments and study with classmates; or just set up your own project site. See *http://smartsite.ucdavis.edu*
- **Searchable electronic databases.** Find them at Shields Library. You'll have free, easy access from on- or off-campus; see *http://www.lib.ucdavis.edu*
- **iTunes and podcasting.** Digital audio recording equipment is installed in several lecture halls, and portable digital recorders are available for loan from IET-Academic Technology Services (Surge II). Podcasting services are available to all instructors and campus groups; see *http://itunes.ucdavis.edu* & *http://podcast.ucdavis.edu*
- **Classroom technology.** All 126 general assignment classrooms have audio, network and projection capabilities, and include a projector, CD player, DVD player, VCR, built-in microphone and laptop hookup. Classrooms with more than 50 seats also have assistive hearing systems; see *http://iet.ucdavis.edu/rooms/classrooms.cfm*

The Essentials: Computers, E-mail, Software, Labs

- **E-mail.** Every student has a free Gmail-based e-mail account; see *http://davis.ucdavis.edu*

Computer purchases. Our recommendations can help guide your purchases. Financial aid is available for qualified applicants; see *http://computerownership.ucdavis.edu*. To buy computers and accessories at the campus bookstore, see *http://bookstore.ucdavis.edu/*

- **Software.** Free licenses for Sophos anti-virus and Endnote bibliographic software. Other programs are available free of charge or at a discount; see *http://my.ucdavis.edu/software*
- **Multimedia.** You'll want to check out the video, audio, and graphic design software, as well as printers, scanners, etc., in the Hart Media Lab; see *http://hartmedialab.ucdavis.edu*
- **Computer rooms.** There are 11 computer classrooms and seven computer labs distributed around the campus, providing access to PCs, Macs and printing services. Some labs have both Mac and PC computers, and many have extended hours during the week; see *http://iet.ucdavis.edu/rooms*
- **Printing.** Available in all computer rooms. Six rooms also have color printing; see *http://clm.ucdavis.edu/rooms/printing*
- **Wireless printing** is also available. It lets you send a print job from your computer, over the Internet, to any printer in the 18 computer rooms; see *http://wirelessprinting.ucdavis.edu*

Networking

- **Wireless Internet.** MoobilenetX is the campus secure wireless network. You can access it throughout much of the central campus, including Shields Library and the Memorial Union. For access requirements and instructions, see *http://wireless.ucdavis.edu*
- **Wired Internet.** You can also access the Internet by connecting to open-access network access modules (NAMs), located in many study areas and libraries. Students living on campus can connect directly to the Internet from their rooms by using ResNet, the high-speed residence hall network. Each residence hall also has a computer center with computers, printers, and scanners. See *http://www.housing.ucdavis.edu/computers/*

Security

Computer security. Blocking computer viruses and preventing unauthorized access to computing systems are important parts of campus computing life. Keep up with campus security efforts, review instructions on how to maintain your computer system, and guard against security problems, including compromised passwords and identity theft; see *http://security.ucdavis.edu*.

Technical Support

IT Express. Free computing help with almost anything related to campus tech, call (530) 754-HELP (4357) or see *http://itexpress.ucdavis.edu*.

Computer maintenance & repair. Consulting and repair services (fees apply) for help with viruses and malware; software installation, patching and maintenance; data recovery; etc.; see *http://itps.ucdavis.edu/*.

All information above is current as of spring 2010. For the latest updates and tech news, please see the Student Computing Guide at *http://studentcomputing.ucdavis.edu/*.

RESEARCH PROGRAMS AND RESOURCES

Organized Research Units

Organized Research Units (ORUs) are campuswide interdisciplinary research programs that further the university's missions of teaching, research and public service, but do not offer courses of instruction. Members of an ORU come from more than one department and normally from more than one school, college division.

Air Quality Research Center

3047-3053 Bainer Hall (530) 754-8374
Anthony Wexler, Director; *aswexler@ucdavis.edu*
/http://airquality.ucdavis.edu/

Air pollution adversely affects health, welfare and ecosystems directly or indirectly. Atmospheric pollutants reside in either the gas phase, such as ozone or benzene, or the particulate phase, such as soot or sulfuric acid. Researchers at UC Davis employ measurements in the field and in laboratories, theoretical approaches, mathematical models, and policy analysis to tackle state, federal and intercontinental air quality problems. The center is composed of over 60 faculty and research staff from six schools and colleges across campus, so takes a broad, interdisciplinary approach to air quality problem solving.

Bodega Marine Laboratory and Reserve

Bodega Marine Laboratory
P.O. Box 247
Bodega Bay, CA 94923
(707) 875-2211; Fax (707) 875-2009;
ucdbml@ucdavis.edu
http://www.bml.ucdavis.edu

The Bodega Marine Laboratory is dedicated to research and teaching in marine science. Research areas include impacts of climate change, marine ecology, coastal terrestrial ecology, oceanographic influences on marine populations, impacts of non-native species, responses of marine organisms to environmental stress and pollution, and fisheries ecology and conservation. Well-equipped facilities feature running seawater in two classrooms and most laboratories, a marine science library, lecture hall, housing facilities, computer labs, microscope imaging facility, climate change facility, greenhouses, experimental freshwater system for anadromous fish studies, network of automated environmental sensors on marine and terrestrial habitats, 42-foot research vessel and various small boats, and a dive locker and air station. Faculty teach a number of undergraduate and graduate courses during the academic year and summer session. The laboratory is located in Bodega Bay, Sonoma County, 100 miles west of Davis.

The Bodega Marine Reserve, part of the UC Natural Reserve System, is 362 acres of remarkably diverse habitats, including an excellent rocky intertidal zone, sand beaches, saltmarsh, lagoon tidal flats, freshwater marsh, coastal prairie and dunes. The reserve also administers adjacent subtidal sand and rock habitats in a marine life refuge. Areas of research include a broad spectrum of field studies of plants and animals in coastal marine, intertidal and terrestrial ecosystems.

California National Primate Research Center

Primate Center
(530) 752-0447; *http://www.cnprc.ucdavis.edu*

The California National Primate Research Center (CNPRC) investigates selected human health problems for which the nonhuman primate is the animal model of choice. Research programs include brain, mind and behavior, reproductive sciences and regenerative medicine, respiratory diseases, infectious diseases, immunology, stem cell biology, gene therapy, genetics and a variety of biomedical collaborative research projects. Self-sustaining breeding colonies of macaques are available for study of spontaneously occurring disorders.

Center for Health and the Environment

(530) 752-1340; *http://che.ucdavis.edu/*

The Center for Health and the Environment (CHE) coordinates and engages in interdisciplinary research on environmental agents, including chemicals and radiation, and health outcomes in humans, animals and other organisms. Researchers conduct epidemiologic studies in human populations, as well as experiments in whole animals, organisms, cells and molecules. Research on the development of agents for population control of humans and wildlife seek to mitigate the adverse effects of overabundance on the environment. Studies on toxic, radioactive, mutagenic, carcinogenic and teratogenic compounds are carried out in special animal holding facilities. Laboratories are equipped for studies in analytical chemistry, biochemical toxicology, cell and molecular biology, endocrinology, inhalation toxicology, morphology and reproductive and developmental biology. The Center houses a major university-wide program and federally funded center in occupational and agricultural medicine, nanotechnology and, a School of Medicine program in reproductive biology.

Crocker Nuclear Laboratory

(530) 752-1460; *http://crocker.ucdavis.edu*

The Crocker Nuclear Laboratory is an interdepartmental laboratory for the application of nuclear science to a variety of disciplines, including air pollution and visibility, nuclear physics and chemistry, medical therapy with proton beams, material damage studies, and the effect of background and extraterrestrial radiation on electronic components.

Institute for Data Analysis and Visualization

2343 Academic Surge (530) 752-6298
Kenneth Joy, Director; *kijoy@ucdavis.edu*
http://idav.ucdavis.edu

The mission of the Institute is the integration of research efforts at UC Davis in data analysis and visualization. The Institute draws students and faculty from a variety of departments and colleges, allowing researchers to work together on real-world, applied problems that deal with the massive data analysis and visualization problems encountered in science, engineering, and other fields. The integration of the two fields, especially in biological applications of high throughput biological assay data such as gene expression arrays, proteomics, metabolomics and NMR spectroscopy, produce methods that impact a substantial number of scientific fields. In neuroscience, computer science, computational science, computational physics, and engineering applications, the Institute contributes data exploration and problem-solving methods through visualization, computer graphics, data analysis, and expressive interfaces that enable discovery and analysis from massive information streams. The collaborative efforts of the faculty and students of the Institute enable the University to address a wide-variety of application areas and contribute methods that enable scientists and engineers to make decisions from their data.

Institute of Governmental Affairs

Robert Huckfeldt, Director
360 Shields Library
(530) 752-2042; Fax (530) 752-2835; *http://www.iga.ucdavis.edu*

The Institute of Governmental Affairs (IGA) serves as a research base for social science faculty at UC Davis. IGA serves approximately 60 faculty from 10 campus departments as well as scholars visiting from throughout the United States and around the world.

Located in the core of the UC Davis campus, IGA houses eight formal research programs: Center for International Data; Center for State and Local Taxation; Center for the Evolution of the Global Economy; Conflict Processes Group; Economy, Justice and Society (EJS); Migration Dialogue; Program on Decision-making, Communication and Uncertainty; and Rural Economies of the Americas Program (REAP).

Specialized services include grant advising, preparation and administration; research program development; library and data services; social science computing, programming and statistical consulting; seminar, workshop and conference organization; and much more. The institute sponsors an active public affairs program and enhances the education of students by providing research opportunities. IGA serves as the UC Davis liaison to the systemwide program, Institute on Global Conflict and Cooperation (IGCC) and the All-UC Group in Economic History.

Institute of Transportation Studies

2028 Academic Surge (530) 752-6548
Dan Sperling, Director; *dsperling@ucdavis.edu*
http://www.its.ucdavis.edu

The Institute of Transportation Studies conducts multidisciplinary research on complex problems related to traffic congestion and local and global pollution and disseminates research results to the broader academic and professional community. Research priorities are travel behavior, alternative-fueled vehicle technology and policy, energy and environmental projects and advanced vehicle and highway systems. About 60 faculty members and 130 graduate students from more than 13 academic disciplines, including four Engineering departments, Economics, Environmental Science and Policy, Ecology, Agricultural and Resource Economics, and the Graduate School of Management, participate in the research activities of the Institute. The Institute administers a graduate program in Transportation Technology and Policy, and a number of research centers, including the U.S. DOT Sustainable Transportation Center (STC), the U.S. DOE Graduate Automotive Technology Education (GATE) center, the UC Davis Energy Efficiency Center (EEC), the UC Davis Plug-In Hybrid Electric Vehicle (PHEV) Center, and the Sustainable Transportation Energy Pathways (STEPS) program.

Nanomaterials in the Environment, Agriculture and Technology (NEAT)

4415 Chemistry Annex (530) 752-3292
Alexandra Navrotsky, Director; *anavrotsky@ucdavis.edu*
http://neat.ucdavis.edu/

NEAT is a multidisciplinary research and education program which links the fundamental physics, chemistry, and engineering of small particles and nanomaterials to several challenging areas of investigation including *(1)* applications in ceramic, chemical, electronic, environmental, and agricultural technology, *(2)* environmental transport and transformation and resulting roles in environmental pollution and remediation, *(3)* interactions with the biosphere, especially microorganisms and *(4)* effects on health.

John Muir Institute of the Environment

Mark Schwartz, Director (530) 754-9135

The John Muir Institute of the Environment (JMIE) supports innovation and discovery aimed at solving real-world environmental problems. The institute's faculty are committed to strengthening the scientific foundation for environmental decision making through collective entrepreneurship, a team-oriented approach that recognizes the complexities of environmental problems and the societal context in which they occur. JMIE champions science and technological innovation, provides campus-wide leadership, hosts centers and projects, and seeds research and educational initiatives to solve real-world environmental problems. The institute links science and technology to policy by providing the intellectual setting for interactions between researchers, regulatory agencies, policy-makers and the public.

Program in International and Community Nutrition

Kathryn G. Dewey
3253 Meyer Hall
(530) 752-1992; Fax (530) 752-3406; *kgdeweykgdewey@ucdavis.edu*
http://picn.ucdavis.edu

Faculty members of the Program in International and Community Nutrition are studying the epidemiology and causal mechanisms of the major nutritional problems of human populations in low-income countries and in disadvantaged ethnic minority groups in the United States, with the ultimate objective of planning, implementing and evaluating programs to ameliorate these problems. Current areas of research include maternal and child nutrition, control of micronutrient deficiencies, determinants of food intake, nutrition and infection, nutritional assessment, and food and nutrition programs and policy.

ADDITIONAL RESEARCH CENTERS AND RESOURCES

Adult Fitness Program

UC Davis Sports Medicine Program
(916) 734-6805

The UC Davis Adult Fitness Program is designed to help individuals improve their health and physical fitness to prevent disease and improve quality of life. Our team of exercise specialists includes sports medicine physicians, exercise physiologists and nutritionists trained by UC Davis Sports Medicine, Exercise Biology and Nutrition Faculty in exercise testing and prescription and sports nutrition. This program exists to provide a public health service to the university and surrounding communities; to provide clinical learning opportunities for UC Davis students; to provide opportunities to study the benefit of exercise and proper nutrition in the prevention of disease and assist individuals in evaluating their progress through discounted repeat testing and evaluation.

Advanced Highway Maintenance & Construction Technology Center (AHMCT)

Academic Surge 1003 (530) 752-5981
Steve Velinsky, Director; *savelinsky@ucdavis.edu*
Bahram Ravani, Director; *bravani@ucdavis.edu*
http://www.ahmct.ucdavis.edu/

In cooperation with state, federal, and private agencies, the center performs research and development on equipment and methods to improve the safety of highway systems, including their construction and maintenance.

The Advanced Highway Maintenance and Construction Technology Research Center (AHMCT) extends the reach of Caltrans with technology, analysis, and communications.

We are primarily a project oriented research center on the campus of UC Davis that develops concept vehicles and equipment for the California Department of Transportation. AHMCT has delivered 16 vehicles and 18 pieces of software and equipment to Caltrans.

We also help Caltrans access university and industry research, maintain a leadership position in maintenance and construction technology, access federal and pooled funds for research, test and evaluate new technologies, improve the Caltrans public image as a technology oriented organization, and train students and professionals in transportation operations and technology.

Innovative technology can keep workers in vehicles for many highway maintenance tasks or behind barriers for other tasks. Also, tools exist to make on-the-ground lifting, moving, cutting, filling, and clearing tasks easier and safer. Key off-the-shelf technologies include computers, robotics, sensors, interfaces, GPS, GIS, communications, databases, materials, and hydraulics

Advanced Transportation Infrastructure Research Center Facility (ATIRC)

West Campus
John Harvey, Director (UCPRC); *jtharvey@ucdavis.edu*

The UC Davis Advanced Transportation Infrastructure Research Center (ATIRC) project provides a facility for two research programs: the UC Pavement Research Center (UCPRC) and the Advanced Highway Maintenance and Construction Technology Research Center (AHMCT). Research at the UCPRC at ATIRC includes accelerated pavement testing of new types of materials and pavement structures using the Heavy Vehicle Simulators, laboratory specimen preparation and testing, and analyses. ATIRC houses the UC Davis staff of the UCPRC.

Agricultural Sustainability Institute

Thomas P. Tomich, Director
143 Robbins Hall
(530) 752-3915; Fax (530) 752-2829; *asi@ucdavis.edu*
http://asi.ucdavis.edu/

The Agricultural Sustainability Institute (ASI) provides a hub that links initiatives and education in sustainable agriculture and food systems across all divisions of the College of Agricultural and Environmental Sciences at UC Davis, across the University of California, and with other partners across the state. ASI includes:

- UC ANR Sustainable Agriculture Research & Education Program (SAREP)
- UC Davis Russell Ranch Sustainable Agriculture Facility

- UC Davis Student Farm
- Advising office for proposed UC Davis undergraduate major in sustainable agriculture and food systems (proposed to begin fall 2010)

The institute distributes a three-times-per year newsletter entitled Sustainable Agriculture; *http://sarep.ucdavis.edu/newsltr/newsletters.htm*.

California Agricultural Experiment Station

College of Agricultural and Environmental Sciences
(530) 752-1610

The California Agricultural Experiment Station branches on the UC Davis, UC Riverside and UC Berkeley campuses. The UC Davis branch includes approximately 500 faculty and CE Specialists in more than 30 departments and units in the College of Agricultural and Environmental Sciences, the College of Biological Sciences and the School of Veterinary Medicine. In addition to laboratory facilities, it has approximately 3,000 acres devoted to field research in the environmental and crop sciences, as well as facilities to support animal and long-term experimental research. The Experiment Station supports faculty in research involving agricultural production, food processing, nutrition, animal care and disease prevention, consumer sciences and community development and in natural resources and ecosystem science management, with an emphasis on maintaining and improving environmental quality of both natural and managed ecosystems.

Center for Advanced Laboratory Fusion Science and Engineering (CALFUSE)

Hertz Hall; Lawrence Livermore National Laboratory
1104 Engineering III; 3182-1209 Kemper; 160 Walker (530) 754-9069
Neville Luhmann, Director; *ncluhmann@ucdavis.edu*
David Hwang, Director; *dqhwang@ucdavis.edu*
http://calfuse.ucdavis.edu/

The purpose of CALFUSE (Center for Advanced Laboratory Fusion Science and Engineering) is to promote interaction between research and educational components, both within the University, and between the University, the National Laboratories, and, industrial laboratories. To accomplish this role, the Center requires a physical presence at the actual research sites. For this reason, the organizational centers of the ORP/ORU are co-located on the main UC Davis campus, and in Hertz Hall at the Livermore satellite campus. Fusion research is an extremely broad education and research field, encompassing topics that cut across numerous engineering, science, and policy disciplines. The initial set of topics includes plasma accelerators, high energy particle accelerators, plasma diagnostics (specifically, millimeter wave and Terahertz technology developments), advanced computing, advanced materials, and energy policy. The Center invites participation from all fields that may have relevance to fusion education and research.

Center for Biophotonics Science and Technology

2700 Stockton Blvd., Suite 1400
Sacramento, CA 95817 (916) 734-8600
Dennis Matthews, Director; *dlmatthews@ucdavis.edu*
http://cbst.ucdavis.edu/

Research and development applications utilizing biophotonics-the science of using light to solve problems in biology and medicine. Applications of biophotonics range from using light to non-invasively measure blood oxygenation, identify cancer cells for diagnosis or guiding treatment, sequencing DNA, and developing super-resolution light microscopes for studying the inner workings of cells.

Center for Child and Family Studies

West House of Center for Child and Family Studies
(530) 752-2888; *http://ccfs.ucdavis.edu*

The Center for Child and Family Studies (CCFS) houses the Early Childhood Laboratory (ECL), a research, teaching and demonstration laboratory of the Division of Human Development and Family Studies in the Department of Human and Community Development. At the ECL, students enrolled in human development courses learn observational techniques and participate with peers, children, parents and professionals in developmental programs for infants through preschoolers. Students study early development in a naturalistic setting, linking research and theory to principles of interaction and learning about developmental differences. Selected undergraduate students participate in faculty and graduate student research at the laboratory. The CCFS also houses several research and outreach facilities, including the Eichhorn Family House.

Center for Computational Fluid Dynamics

2132 Bainer Hall (530) 752-0580
Department of Mechanical and Aerospace Engineering;
http://mae.ucdavis.edu/research/cfd/

The Center uses modern computation facilities, including a Massively Parallel Supercomputer, to explore complex motions of fluids. Applications are to fluid flows and aeronautics, including mesh generation, analysis and design of aerodynamic configurations, turbulence modeling, electromagnetism, chemically reacting flows, biological fluid dynamics computations, and wind energy research.

Faculty and students are working on many aspects of this growing field, including structured and unstructured grid generation and adaptation; finite volumes and finite element schemes, convergence acceleration of iterative techniques; numerical solution of Euler and Navier-Stokes equations; accurate simulation of time-dependent problems for unsteady aerodynamics, gas dynamics and electromagnetics; numerical simulation of fluid problems with heat and mass transfer; numerical studies of combustion and chemically reacting turbulent flows; turbulence and modelings; and flow simulation in turbomachinery. Emphasis is placed on fundamental concepts in the physics and numerics of problems that cover a wide range of practical industrial applications.

Center for Future Information Technology

2063 Kemper Hall (530) 754-8380
Prasant Mohapatra, Director; *prasant@cs.ucdavis.edu*
http://cfit.ucdavis.edu/

On our tenets of open collaboration and interdisciplinary participation, our vision for the center is to innovate the future of information technology through vital research that has cross cutting impact on the broad applications of information technology; through university and industrial working partnerships, set an imaginative direction, yet influence a pragmatic roadmap for the future of IT that has intellectual, societal, environmental and commercial value.

Center for Geotechnical Modeling

2655 Brooks Road (530) 752-7929
Ross W. Boulanger, Director; *rwboulanger@ucdavis.edu*
http://cgm.engineering.ucdavis.edu/

The center performs research in the broad area of geotechnical engineering, but focuses on earthquake engineering problems such as effects of ground shaking and liquefaction and soil-foundation-structure interaction for buildings, bridges, dams, tunnels,

and port facilities. The center performs numerical simulations using advanced computational tools, develops design procedures and new techniques for site characterization, but emphasizes physical modeling using one of the world's largest and most advanced geotechnical centrifuge facilities. The centrifuge is available for shared use by researchers from around the country and is supported by the George E. Brown, Jr., Network for Earthquake Engineering Simulation.

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

3179 Kemper Hall (530) 752-7063
Ben Yoo, Director; *yoo@ece.ucdavis.edu*
http://ucdavis.citris-uc.org

CITRIS is one of the California Institutes of Science and Innovation involving a partnership between four UC campuses (UC Davis, UC Berkeley, UC Merced and UC Santa Cruz).

The Center for Information Technology Research in the Interest of Society (CITRIS) creates information technology solutions for many of our most pressing social, environmental, and health care problems. CITRIS was created to "shorten the pipeline" between world-class laboratory research and the creation of start-ups, larger companies, and whole industries.

CITRIS facilitates partnerships and collaborations among more than 300 faculty members and thousands of students from numerous departments at four UC campuses (Berkeley, Davis, Merced and Santa Cruz) with industrial researchers from over 60 corporations. Together the groups are thinking about IT in ways that have not been thought of before. They see solutions to many of the concerns that face all of us today, from monitoring the environment and finding viable, sustainable energy alternatives to simplifying health care delivery and developing secure systems for electronic medical records and remote diagnosis, all of which will ultimately boost economic productivity. CITRIS represents a bold and exciting vision that leverages one of the top university systems in the world with highly successful corporate partners and government resources.

Center for Molecular Genomic Imaging (CMGI)

451 Health Sciences Drive (530) 754-8960
Simon Cherry, Director; *srcherry@ucdavis.edu*
http://imaging.bme.ucdavis.edu/

The Center for Molecular Genomic Imaging (CMGI) offers the research community state-of-the-art imaging technologies for in vivo small animal research. With the use of increasingly sophisticated animal models of human disease, imaging studies are expected to provide new insights in many areas of biomedical research, including oncology, cardiology, neuroscience and pharmacology. It is anticipated that molecular and genomic imaging will lead to advances in basic science, as well as to the development of new diagnostic and therapeutic tools for use in the clinical setting. The CMGI currently provides and supports positron emission tomography (microPET), x-ray computed tomography (microCT), ultrasound, and optical (bioluminescent and fluorescent) scanning procedures for non-invasive imaging of small research animals. CMGI also supports magnetic resonance imaging (MRI) at the adjacent UC Davis NMR Facility. In addition, a satellite facility at the California National Regional Primate Center houses a microPET scanner for imaging non-human primates. The CMGI operates a biomedical cyclotron and radiochemistry facility for synthesizing short-lived radiotracers for PET imaging. CMGI staff provide services that include consultation, protocol planning and experimental design, animal handling and physiologic monitoring, injection of contrast agents and radiopharmaceuticals, scanning, data reconstruction and visualization, image analysis and data backup. The CMGI facilities are open to all researchers at UC Davis, and are also open, on a space-available basis, to external researchers. CMGI is supported in part by grants from the National Cancer Institute. A full service animal vivarium adjacent to the imaging suites is available for housing research animals. We also offer assistance with study design, probe development and image analysis.

Center for Neuroscience

Cameron Carter, Interim Director
1544 Newton Ct., Davis, CA 95618
(530) 757-8708; Fax (530) 757-8827;
http://www.neuroscience.ucdavis.edu

The Center for Neuroscience is an interdisciplinary unit that serves as the focal point for the study of the neurosciences at UC Davis. Faculty affiliated with the Center are from 13 departments and sections. The center sponsors a seminar series, conferences and symposia, distributes a quarterly newsletter, provides research space for center members and supports graduate students, postdoctoral scholars and distinguished visitors.

Faculty and students are engaged in the study of brain mechanisms responsible for normal human cognitive and perceptual processes and in the study of fundamental aspects of nerve cell function and development. A core group of cognitive neuroscientists uses various imaging techniques and electrophysiological techniques to study both the normal and lesioned cerebral cortex to understand how the normal brain controls behavior. Other faculty members use either animal models to understand how information is processed in the brain or simple systems to study the fundamental biology of nerve function and development and disorders affecting them.

Center on Polymer Interfaces and Macromolecular Assemblies (CPIMA)

Department of Chemical Engineering and Material Science;
(530) 754-6348
Marjorie Longo, Director; *mllongo@ucdavis.edu*
http://cpima.stanford.edu/

CPIMA, a Materials Research Science and Engineering Center of the National Science Foundation, is an academic-industrial partnership comprised of UC Davis, Stanford University, UC Berkeley and IBM Almaden Research Center. The research focus is on interface science of polymers and low-molecular weight amphiphiles, biomolecular materials and hybrid, nanostructured materials with applications in information storage, microelectronics and spatially resolved microanalytical chemistry.

Computer Security Laboratory

2063 Kemper Hall; *seclab-contact@cs.ucdavis.edu*
Matt Bishop, Hao Chen, Karl Levitt, Felix Wu, Directors;
bishop@ucdavis.edu, *levitt@ucdavis.edu*, *wu@ucdavis.edu*, *hchen@ucdavis.edu*
http://seclab.cs.ucdavis.edu/

The mission of the UC Davis Computer Security Laboratory is to improve the current state of computer and information security and assurance through research and teaching. The Security Lab investigates security problems in the network infrastructure, in computer security, and in information assurance in general. Current projects include intrusion detection and response, vulnerabilities analysis, software security, security of various routing and network protocols (especially wireless network protocols), cellular

network security, and malware analysis and defense. The Security Laboratory also researches and detects malicious code (viruses, worms, time bombs, etc.) in programs and detects attempts to penetrate or misuse computer systems. Research projects are supported by corporate and government organizations.

Fuel Cell, Hydrogen, and Hybrid Vehicle (FCH2V) GATE Center of Excellence

2028 Academic Surge, Institute for Transportation Studies;
(530) 752-1934
Paul Erickson, Director; *paerickson@ucdavis.edu*
http://gate.its.ucdavis.edu/

The U.S. Department of Energy (DOE) established the Graduate Automotive Technology Education (GATE) Programs to provide a new generation of engineers and scientists with knowledge and skills in advanced automotive technologies.

Established in 2005, the FCH2V GATE Center at UC Davis is focused on research, education, industrial collaboration and outreach within automotive technology. A systems integration philosophy is guiding the FCH2V Center's education and research activities. The center is using its knowledge and understanding of systems to identify critical research needs and design efficient and effective research and education initiatives. It is integrating the latest thinking on fuel cell and hybrid vehicle systems with hydrogen energy systems modeling. The focus is on training students to approach their work from both micro and macro perspectives-to understand vehicle design at the component as well as systems integration level.

The Center of Excellence is funded by Department of Energy for five years and the center is currently building an industrial partnership to provide opportunity to participate in training the next generation of advanced automotive engineers.

Health Sciences Research Laboratories

The Health Sciences Research Laboratories are biological science facilities with research staff and assistance for faculty, staff and students.

Animal Surgery Laboratory

Buildings H and J; Center for Laboratory Animal Science
(530) 752-7756; *latalken@ucdavis.edu*
esdavisucdavis.edu

This unit is a surgical research facility in compliance with NIH, AAALAC and USDA standards. Instruction in surgical techniques is available including multiple training stations for larger groups. Surgical instruments, drapes, anesthesia machines, scrub suits, and equipment for monitoring vital signs and physiologic parameters are available. Staff are available to perform or assist with both survival and non-survival surgical procedures depending on the investigator's requirements. Staff are also available for post-operative care, data and sample collection as required, and assistance with preparation of the IACUC Protocol for Animal Care and Use.

Human Performance Laboratory

164 Hickey Gym
(530) 752-0965

The Human Performance Laboratory (HPL) was founded in 1963 and has a long history of basic and applied research and outreach in exercise physiology, biomechanics and sports psychology. The HPL has been involved in a variety of research areas since its inception including metabolism, heat stress, fluid balance, injury prevention, body composition and health benefits of physical activity and fitness. The HPL is represented by full-time and adjunct faculty members with varying research backgrounds and scientific interests. The HPL facilities allow measurement of a comprehensive list of human performance characteristics. Investigators have access to advanced data acquisition systems for evaluation in the areas of biomechanics, motor learning, environmental physiology, cardiopulmonary and thermoregulatory physiology, human nutrition and exercise and muscle metabolism. Specific technologies and capabilities include a biochemistry lab, extensive computing facilities, high speed 3-D video motion analysis, ground reaction force measurement, ultrasound imaging, a temperature and humidity controlled environmental chamber and systems for measurement of oxygen consumption, body composition and psychomotor performance. The HPL meets the needs of today's creative researcher and has the capacity to assist in answering tomorrows research questions.

Humanities Institute

Carolyn de la Peña, Director
Jennifer Langdon, Associate Director
227 Voorhies Hall (530) 752-2295; Fax (530) 752-4263

The UC Davis Humanities Institute (DHI) is an interdisciplinary research center that fosters intellectual collaborations and facilitates access to resources for faculty and graduate students who are actively engaged in research and teaching in the humanities, the arts, cultural studies and the humanistically-oriented social sciences. It advocates for the humanities within the UC Davis community and works with funding agencies to secure individual and programmatic resources for HArCS faculty. To explore emerging research areas and provide collaborative opportunities for faculty and graduate students, the Institute sponsors faculty research seminars on designated themes, interdisciplinary research clusters, multi-campus research groups, and the Digital Innovation Lab. The Institute also organizes conferences, workshops and lectures and provides partial funding for events that serve humanities scholars at UC Davis. The Institute is also the home of the California Cultures Initiative, which supports community-based media projects and engaged scholarship on regional issues and works to build connections between humanities scholars at UC Davis and the surrounding region.

Institute for Ultra-Scale Visualization

2127 Kemper Hall;
530) 754-8579
Kwan-Liu Ma, Director; *ma@ultravis.org*
http://www.ultravis.org

The SciDAC Ultra-Scale Visualization Institute, established in 2006, is a research, education, and outreach effort sponsored by the DOE SciDAC program. The Institute's mission is to address the upcoming peta and exa-scale visualization challenges facing computational science and engineering. The Institute fosters the exchange of knowledge between universities, DOE laboratories, and industry to make advanced visualization an integrated component in scientific discovery. The Institute revolutionizes the very process of scientific discovery by equipping scientists with tools that shed light on the knowledge hidden in previously incomprehensible datasets.

Mann Laboratory

103 Mann Laboratory
(530) 754-8313; Fax (530) 752-4554

Plant scientists in the Louis K. Mann Laboratory study the physiology, biochemistry, microbiology and molecular biology of preharvest and harvested fruits, ornamentals, and vegetables to improve and maintain their quality and safety during harvest, storage, processing, distribution and marketing. The five faculty housed in this facility are members of the Department of Plant Sciences and one USDA/ARS research scientist. Research and extension activities are supported by students, postdoctoral researchers and visiting scientists. Research includes s basic plant molecular biology, food safety microbiology, and practical storage technologies for horticultural crops, including whole and lightly processed products. Results are of interest to other researchers in the plant sciences and food science as well as to growers, shippers, transportation and logistics providers, marketers and consumers of fresh fruit and vegetables. The facility is equipped with 18 controlled-temperature rooms, eight research laboratories, specialized post-harvest analytical equipment, advanced rapid test equipment for human pathogens, and a small conference room.

Materials Science Central Facilities

Kemper Hall; lower level rooms 108-165
http://www.matscicf.ucdavis.edu/

Central Facilities is a group of eight laboratories that provide many essential resources for the faculty, students and researchers. Major equipment at MSCF includes a Scintag XDS-2000 powder diffractometer, an SEM (Philips FEI XL30 SFEG) one TEM (Phillips CM-12), a TEM/STEM (JEOL 2500 SE), FT-IR and FT-micro-Raman spectrometers (Bruker RFS 100) and a small-angle x-ray scattering system (Bruker AXS). MSCF is also fully equipped for metallography and electron microscopy sample preparation including a new ion milling system. The goal in developing these laboratories was to provide an infrastructure that could serve the wide range of ongoing research activities in this department and in collaborations with researchers in other departments and institutions. All equipment in this facility is available to users from both within and outside UC Davis at nominal hourly rates. This infrastructure is also a key part of our laboratory teaching program. Students get to use professional, research-grade instruments to do modern, sophisticated experiments similar to those they will be doing in their future employment or in their graduate studies.

Natural Reserve System

The Barn
Susan Harrison, Director
(530) 752-7990;
http://nrs.ucdavis.edu; *http://nrs.ucop.edu*

The UC Davis campus administers five reserves that are available for teaching and research.

- Bodega Marine Reserve, located at Bodega Bay, 100 miles west of campus, consists of coastal dune vegetation and bay and coastal tidal areas with facilities for overnight and longer stays; see Bodega Marine Laboratory and Reserve, on page 23.
- Jepson Prairie Reserve, located in Solano County 13 miles south of Dixon, consists of native California bunchgrass grasslands, vernal pools, playa lakes and freshwater sloughs.
- Donald and Sylvia McLaughlin Reserve, located near Clear Lake about 70 miles northwest of campus, consists of Inner Coast Range habitat with a mix of serpentine and non-serpentine soils. The reserve has a facility for long-term overnight stays with a well-equipped kitchen, full bath and a camping area for class groups.
- Quail Ridge Reserve consists of Inner Coast Range habitat located about 30 miles west of campus on a peninsula jutting into Lake Berryessa. The reserve has a facility with a well-equipped kitchen, full bath, 3 four-wheel drive vehicles and camping areas for groups.
- Stebbins Cold Canyon Reserve, located about 24 miles west of campus, has representative populations of several different plant communities found in California's Inner and Outer Coast Ranges.

The university maintains over 35 reserves throughout the state, many of which are available for teaching and research.

Northern California Nanotechnology Center

West Wing Kemper Hall; Office1125 Kemper Hall;
(530) 754-9518
Frank Yaghmaie, Director; *fyaghmaie@ucdavis.edu*
http://ncnc.engineering.ucdavis.edu/

The Northern California Nanotechnology Center (NCNC), a new research/teaching/industry facility for nanotechnology and microfabrication, is housed in the College of Engineering at UC Davis. NCNC is a world class center for the synthesis, fabrication, and analysis of nanoscale devices and materials for applications in:

- Electronic devices
- Medicine
- Biology
- Environment
- Optics

Opened in 2004, the Northern California Nanotechnology Center operates a 10,000+ square foot class 100 cleanroom laboratory. The laboratory is available for use by UC Davis faculty, students and staff on a recharge basis. Students, research staff and research faculty may use any tool in the facility after they have passed a training/certification module. Local industry may also be interested in using the facility by becoming an Industrial Affiliate.

Nuclear Magnetic Resonance Facility

Medical Sciences 1D
(530) 752-7677; *http://www.nmr.ucdavis.edu*

The Nuclear Magnetic Resonance Facility provides access to state-of-the-art NMR instrumentation for spectroscopy and imaging to researchers in the biological, medical and physical sciences. At present, the facility operates ten spectrometers of varying purposes and capabilities at field strengths from 300 to 800 MHz. Applications include structural characterization of organic molecules, determination of protein structure and dynamics, imaging and in vivo spectroscopy of small animals, plants, and materials, and spectroscopy of solids. The Facility also has workstations for off-line data processing. Three full-time staff members are available to assist campus researchers in utilizing the instrumentation.

UC Pavement Research Center

3153 Engineering III;
(530) 754-6409
John Harvey, Director, UC Davis Site; *jtharvey@ucdavis.edu*
http://www.ucprc.ucdavis.edu

The UC Pavement Research Center (UCPRC) uses innovative research and sound engineering principles to improve pavement

structures, materials and technologies. Work at the UCPRC focuses on asphalt and concrete pavements, including design, materials, rehabilitation, life cycle, maintenance and reconstruction; pavement cost analysis and strategy selection, effects of pavement activities on traffic in urban areas, pavement performance modeling and environmental life cycle assessment for pavements.

Social Science Data Service

105 Social Sciences and Humanities Building
(530) 752-4009; *http://www.ssds.ucdavis.edu*

The Social Science Data Service (SSDS) is a unit of the Institute of Governmental Affairs (IGA). SSDS provides quantitative computing and consulting services in support of faculty and graduate students involved in social science research on the UC Davis campus. SSDS provides consulting services for the wide range of software used by social scientists and assists with questions regarding the use of SSDS computers and statistical and data-related programming. SSDS manages a UNIX system and a PC research lab used for quantitative social science computing. Specialized support is available for extramurally funded research projects managed by IGA.

Sustainable Transportation Energy Pathways (STEPS)

2028 Academic Surge, Institute for Transportation Studies;
(530) 752-1934
Paul Erickson, Director; *paerickson@ucdavis.edu*
http://steps.ucdavis.edu/

Established in 2007, the STEPS program aims to inform the public debate and to assist the private sector and government agencies by providing tools and knowledge concerning sustainable transportation alternatives. Nineteen generous sponsors fund a STEPS research team that includes fifteen faculty and research scientists and twenty-five graduate students, drawn from a variety of departments. Over the past few months STEPS research leaders have contributed to policy discussions on Low Carbon Fuel Standards (LCFS), sustainability of alternative fuels, federally implemented vehicle scrappage programs, fuel economy standards and the U.S. auto industry bailout. In addition, STEPS researchers are enormously productive, generating seven UC Davis research reports, five peer-reviewed publications and one book in the recent year.

Tahoe Environmental Research Center (TERC)

UC Davis Administration Office; Watershed Sciences Building;
(530) 754-8372
TERC site Laboratories in Incline Village, NV (775) 881-7560
Geoffrey Schladow, Director; *gschladow@ucdavis.edu*
http://terc.ucdavis.edu/

The Tahoe Environmental Research Center is dedicated to research, education and public outreach on lakes and their surrounding watersheds and airsheds. Lake ecosystems include the physical, biogeochemical and human environments, and the interactions among them. The Center is committed to providing objective scientific information for restoration and sustainable use of the Lake Tahoe Basin.

UC Agricultural Issues Center

252 Hunt Hall;
(530) 752-2320; *agissues@ucdavis.edu*
http://www.aic.ucdavis.edu

The UC Agricultural Issues Center is a university-wide research and outreach unit that draws on expertise from many disciplines. The center focuses on California's agricultural issues related to science and technology, international trade and markets, agribusiness trends, rural-urban issues, natural resources and the environment, human resources and agricultural policy.

UC Davis Center for Plant Diversity

Formally the UC Davis Herbarium
Dr. Dan Potter, Director; Ellen Dean. Curator
1026 Sciences Laboratory Building, Department of Plant Sciences
(530) 752-1091;*http://herbarium.ucdavis.edu*

The UC Davis Center for Plant Diversity provides information on the names, uses, toxicity and distribution of plants. Anyone can visit the Herbarium to use its dried plant collections (300,000 specimens), botanical library and microscopes, but a phone call is suggested to make sure staff will be available to assist you. The collections are used most commonly to check plant identifications, but they are also used by campus faculty and students for teaching and research in plant systematics and ecology. Herbarium staff answer hundreds of public service requests each year (especially identification of weeds and poisonous plants). Collections include vascular plants, bryophytes, lichens and algae. The majority of these specimens are angiosperms (flowering plants), mainly from California, but the collections are worldwide in scope, with strong holdings from North America, Ecuador, Baja California and regions with Mediterranean climate regimes. The herbarium is well known for its collection of weeds and poisonous plants, although it also has world-class collections of grasses, oaks and spurges. The Herbarium's support group, the Davis Botanical Society, hosts a wide range of botanical events, workshops and trips each year.

UC Davis Energy Institute

2231 Academic Surge, University of California, Davis;
(530) 754-8566
Bryan Jenkins, Director; *energy@ucdavis.edu*
http://energy.ucdavis.edu

The Energy Institute at UC Davis is home to energy research and education programs of the University of California, Davis, and was established in 2007 to help accelerate the global transformation to a sustainable energy future. The Energy Institute is structured to coordinate UC Davis' world-class campus strengths in energy research, education and outreach for the purpose of fostering new innovations, expanding public service and informing decision making around new energy solutions. The Energy Institute encompasses critical areas of UC Davis' energy research—including renewable and sustainable energy systems, energy efficiency, fuels and transportation, infrastructure, environment and economics. The Energy Institute is actively targeting the demand for well-trained energy professionals. A new energy graduate group, proposed to start fall of 2010, will offer M.S. and Ph.D. degrees with comprehensive education in energy in the areas of energy science and technology and energy management and policy.

UC Davis J. Amorocho Hydraulics Laboratory (JAHL)

Dept. of Civil and Environmental Engineering;
(530) 752-2385
M. Levent Kavvas, Director; *mlkavvas@ucdavis.edu*
http://jahl.engr.ucdavis.edu/

UC Davis J. Amorocho Hydraulics Laboratory's research areas include engineering hydraulics, fisheries protection, and ecological and environmental hydraulics. UC Davis JAHL was built to perform hydraulic modeling studies for the California State Water Project in the 1960s. It has been conducting hydraulic investigations through scaled physical models, prototype models and numerical models to provide modeling service to federal, state, local water agencies and private entities. Recently conducted research include sturgeon passage study, debris removal/trashrack/traveling screen study, fish treadmill study of fish behaviors near long fish screens, Devil Canyon power plant afterbay hydraulics, and Gorman Creek flood control channel hydraulics, etc.
UC Davis JAHL has been actively participating in the development of solutions to fish protection technologies for the Bay Delta river system. Researchers in UC Davis JAHL, including fish biologists and hydraulic engineers, have many years of experience on testing Sacramento River and Bay Delta fish species under various hydraulic and environmental conditions. They also have extensive experience in handling invasive water plant species that occur in the Delta fish facilities, such as Egeria. Researchers at UC Davis JAHL, with the help of the state and federal agencies, has been pursuing the application of new fish protection technologies and developing a better understanding of the hydraulic and biological issues in the Sacramento River and Bay Delta system.

Veterinary Genetics Laboratory (VGL)

DNA Laboratory, Old Davis Road
(530) 752-2211

The laboratory provides comprehensive, high-quality genetic testing and research of domestic, companion and wildlife animal species including horses, cattle, sheep, goats, camelids, dogs, cats, wild felids and canids, bears, birds and primates. Research activities involve the application of genomic and molecular tools to study genetic mechanisms of inheritance of phenotypic and health-related traits, to characterize and analyze population structure, and to develop forensic applications for domestic and wildlife animal species. Activities include high-throughput DNA genotyping, Y-chromosome haplotyping, and mitochondrial DNA sequencing for applications in animal identification, parentage verification, forensic analyses, population structure and genetic diversity. Projects include genetic mapping of phenotypic traits, coat color and disease genes in horse, dogs and cats; identification of causative mutations; development and validation of microsatellite and single nucleotide polymorphism markers for several species; development of robust.

DNA genotyping methods for individual identification and diagnostic tests; genetic structure studies of animal populations through allele frequency, Y-haplotypes and mitochondria sequence analyses; software development for DNA genotyping and electronic data interchange for reporting laboratory results. VGL is involved in high profile criminal cases both nationally and internationally through their Forensic Unit.

Veterinary Medicine Teaching and Research Center (VMTRC)

UC Davis VMTRC
18830 Road 112
Tulare, CA 93274
559-688-1731; *http://www.vmtrc.ucdavis.edu*

The Veterinary Medicine Teaching and Research Center (VMTRC) is a clinical teaching and research center within the UC Davis School of Veterinary Medicine. The center offers a forum for teaching, research and service programs for D.V.M. students, M.P.V.M. students, graduate students, residents, university faculty and visiting researchers interested in food animal production medicine and agroecosystem health. VMTRC programs emphasize herd health, epidemiology and preventive medicine, production management, nutrition, agricultural economics, environmental protection, food safety/defense, animal welfare, and sustainable livestock production systems.

X-Ray Crystallographic Laboratory

James C. Fettinger, Ph.D.
Department of Chemistry
(530) 754-7822

The X-Ray Crystallographic Laboratory, located in the Department of Chemistry, provides crystal structure determinations for researchers. Single crystals from all branches of chemistry are studied. The laboratory is equipped with three single crystal Bruker X-ray diffractometers, an APEX Duo equipped with both Cu and Mo anode sources, and two Mo source systems, an APEXII and a SMART1000. The laboratory also possesses a stereo-microscope. All instruments have variable low temperature systems including the capability of cooling the crystal to 5K. Consultation and collaboration on a variety of single crystal related projects can be arranged.

UNDERGRADUATE ADMISSIONS

UNDERGRADUATE ADMISSIONS

Undergraduate Admissions
One Shields Avenue
University of California
Davis, CA 95616-8507
(530) 752-2971; Fax (530) 752-3712
http://admissions.ucdavis.edu

APPLYING TO UC DAVIS

Apply for admission online at *http://www.universityofcalifornia.edu/apply*.

The initial filing periods to apply for undergraduate admission and scholarships at UC Davis are as follows:

Quarter	Initial Filing Period (prior year)
Fall	November 1-30
Winter*	July 1-31
Spring*	October 1-31

*UC Davis is rarely open to new applicants for winter and spring quarters.

For up-to-date details regarding winter and spring quarters, and tips on completing the UC application for admission and the personal statement, see *http://admissions.ucdavis.edu/admissions/apply*.

After applying, transfer students are required to update their grades and course records online through the UC Application Update (AU) to ensure that the campuses have the most current academic information available. See *http://www.universityofcalifornia.edu/admission/appupdate* for details and deadlines.

APPLICATION FEES

The application fee of $60 for domestic students and $70 for international students entitles you to apply to one University of California campus. If you want to apply to more than one UC campus, you must pay an additional fee for each campus you select. These fees are not refundable. Applicants will be prompted to pay the fee(s) before submitting the online application. If you submit a check or money order, it should be made payable to the Regents of the University of California.

The University of California will waive application fees for up to four campuses for qualified students who otherwise would be unable to apply for admission. Students who qualify for fee waivers and who select more than four campuses must pay $60 for each additional choice. To be accepted for the application fee waiver program, you must meet specific requirements related to your family income and size. The fee waiver program is for United States citizens and permanent residents only. You can apply automatically for a fee waiver on the online application. For details, see *http://www.universityofcalifornia.edu/admissions/undergrad_adm/apply/how_apply/apply_fees.html*.

ADMISSION AS A FRESHMAN

The University of California defines a freshman applicant as one who is either currently enrolled in, or has graduated from, a high school and has not registered in a regular session at any collegiate-level institution since high school graduation. An applicant who has completed college courses while in high school or in a summer session immediately following high school graduation is considered a freshman applicant.

The University of California will accept the Certificate of Proficiency or the General Education Development (GED) certificate awarded by the State Department of Education in lieu of the regular high school diploma. However, you must also meet all other university entrance requirements (subject, scholarship and examination).

Admission requirements for California residents are different from those for nonresidents. Nonresidents must meet higher scholarship requirements.

Meeting the UC eligibility criteria qualifies you for admission to a UC campus, but does not guarantee admission to UC Davis. Due to limited enrollment space and the extraordinary size and strength of the UC Davis applicant pool, many qualified candidates are denied admission. Applicants who are admitted generally well exceed UC eligibility criteria. The selection criteria that UC Davis considers as part of its comprehensive review process for each UC-eligible applicant are available at *http://admissions.ucdavis.edu/admissions/fr_selection_process*.

Freshman Admission Policy Changes

Beginning with the class entering in fall 2012, UC's freshman admission policy is changing. Under the new policy, all California high school seniors who:

- Complete the 15 UC-required college-preparatory (“a-g”) courses, with 11 of those done by the end of 11th grade,
- Maintain a GPA of 3.00 or better (weighted by honors/AP bonus points) in these courses, and
- Take the ACT with Writing or SAT Reasoning Test (SAT Subject Tests will no longer be required)

will be invited to apply and will be entitled to a comprehensive review of their applications at each UC campus to which they apply.

Within this “entitled to review” pool, two categories of applicants will be guaranteed admission somewhere within the UC system:

- Those who fall in the top 9% of all high school graduates statewide, and
- Those who rank in the top 9% of their own high school graduating class

For details, see *http://www.universityofcalifornia.edu/news/eligibilitychanges*.

UC Freshman Eligibility for California Residents

A California resident applying to UC as a freshman has three ways to satisfy the university's minimum admission requirements:

1. Eligibility in the Statewide Context,

2. Eligibility in the Local Context (ELC), and

3. Eligibility by Examination Alone.

Eligibility in the Statewide Context

Most students attain UC eligibility through Eligibility in the Statewide Context. To be eligible, you must satisfy the following subject, scholarship and examination requirements.

Subject Requirement: "a-g"

The following courses must be completed with a *C* grade or better, and for California residents, must be on your high school's UC-approved course list. View your school's UC-approved course list at *http://ucop.edu/doorways*. If you submit courses from an out-of-state school, Undergraduate Admissions will determine if your courses fulfill the Subject Requirement. At least seven of the 15 units (one unit equals one year of study) of the "a-g" requirements must be taken during the last two years of high school.

Courses taken in the 9th grade and completed with a grade of *C* or better can satisfy a subject requirement; however, the grades will not be used in computing your grade point average. If you receive a grade of *D* or lower in a 9th-grade course, you have not satisfactorily completed the subject requirement until you repeat the course (or, in some cases, complete a more advanced course) with a grade of *C* or better.

a. History/Social Science—2 years required

One year of United States history, or one-half year of United States history and one-half year of civics or American government; and one year of world history, cultures and geography.

b. English (or Language of Instruction)—4 years required

If attending a foreign high school where instruction is not in English, literature/composition courses in the native language may be substituted.

c. Mathematics—3 years required; 4 years recommended

Must include algebra, geometry and second-year advanced algebra.

d. Laboratory Science—2 years required; 3 years recommended

Must include at least two of these three subject areas: biology, chemistry, physics.

e. Language other than English—2 years; 3 years recommended

The second year or higher of the same language must be completed to fulfill this requirement (e.g., Spanish I and Spanish II, not Spanish I and French I).

f. Visual and Performing Arts—1 year required

If two separate semester courses of VPA are taken, both courses must be from a single VPA area (dance, drama/theater, music or visual arts).

g. College Preparatory Electives—1 year required

Choose from UC-approved college preparatory electives.

Scholarship Requirement

UC freshman eligibility is determined by a combination of grade-point average (GPA) in "a-g" courses and the UC score total, which is a conversion of the scores you earned on the ACT Assessment plus Writing OR SAT Reasoning Test, AND SAT Subject Tests.

The Scholarship Requirement is satisfied if your GPA is 3.00 or higher and achieves the qualifying UC score total that corresponds to your GPA on the UC Eligibility Index. The index is available at *http://universityofcalifornia.edu/admissions/scholarshipreq*, along with an online calculator you can use to assess your eligibility. A new Eligibility Index will be released in winter 2010 for students applying for admission for fall 2012 and beyond.

Your UC GPA calculation is determined by assigning point values to the grades you earn in "a-g" subjects completed in the 10th and 11th grades, including summer sessions. Courses completed in the 9th grade with a *C* grade or better will be used to meet the Subject Requirement, but will not be calculated into your UC GPA.

Examination Requirement

Freshman applicants are required to take:

- The ACT Assessment plus Writing; for the UC Eligibility Index, see *http://www.universityofcalifornia.edu/admissions/scholarship_req*

OR

- The SAT Reasoning Test; highest reading, math and writing score from one sitting

AND

- Two SAT Subject Tests in two different subject areas; highest two test scores in two different subject areas from any sitting (e.g., science and literature. If mathematics, must be Level 2)

Applicants for fall must take all of the required tests no later than the prior December. Official scores must be received by the end of January. You are responsible for making sure that testing agencies send your scores directly to each campus to which you apply.

Make arrangements to take the required ACT plus Writing exams with your high school or at the ACT website at *http://www.act.org*. The UC Davis ACT code is 0454. Make arrangements to take the required SAT Reasoning Test AND SAT Subject Tests at the College Board website at *http://www.collegeboard.org*. The UC Davis College Board code is 004834.

Eligibility in the Local Context (ELC)

Under the Eligibility in the Local Context (ELC) pathway, the top four percent of graduating students at each participating California high school are designated UC-eligible. More information about ELC is available online at *http://www.ucop.edu/sas/elc*.

Eligibility by Examination Alone

If you do not meet the requirements for Eligibility in the Statewide Context or Eligibility in the Local Context (ELC), you may be able to qualify for admission to UC by examination alone. To be eligible by examination, you must achieve high scores on the required ACT/SAT examinations for freshman admission.

You must satisfy the same examination requirement as students who are eligible in the statewide context, and achieve a UC score total, as calculated by the UC Eligibility Index, of at least 410, or 425 for nonresidents.

In addition, you must earn a minimum UC score of 63 on each component of the ACT or SAT Reasoning Test and on each SAT Subject Test. Calculate your UC score at *http://universityofcalifornia.edu/admissions/scholarshipreq*.

You cannot qualify for admission by examination alone if you have completed 12 or more units of transferable coursework at a college or university following high school graduation or if you have taken transferable college courses in any subject covered by the SAT Subject Tests before taking the exams. It is rare that an applicant is selected for admission to UC Davis based on test-score eligibility alone.

UC Freshman Eligibility for Non-California Residents

If you are an out-of-state resident you must attain a 3.40 GPA or higher in the "a-g" required courses, meet examination requirements and achieve the qualifying UC score total that corresponds to your GPA on the UC Eligibility Index, available at *http://www.universityofcalifornia.edu/admissions/scholarship_req*. You can also become UC eligible by examination alone; please refer to the criteria described in Eligibility by Examination Alone, on page 34.

Transfer Credit

Transfer credit may be granted to a freshman applicant for an acceptable college course taken while still in high school when an official transcript is received from the college that conducted the course and the course is deemed transferable. Transfer credit is granted for each College Board Advanced Placement (AP) Examination completed with a score of 3, 4 or 5. Students completing the International Baccalaureate (IB) diploma with a score of 30 or above will receive 30 quarter (20 semester) units total toward their UC undergraduate degree. The university grants 8 quarter (5.3 semester) units for students who receive IB certificates with scores of 5, 6 or 7 on Higher Level exams. If students take a combination of college courses, Advanced Placement or International Baccalaureate Examinations in the same subject areas, transfer credit may be limited due to duplication of credit.

Advanced Placement (AP) Examinations

If you take a College Board Advanced Placement examination and score 3, 4 or 5, you will be awarded college credit. The credit will become part of the minimum 180 quarter units you need in order to receive a bachelor's degree. The credit from the AP Examinations may also be used to satisfy specific degree requirements.

See College Board Advanced Placement (AP) Examination Credit, on page 36, to learn how many units you may receive for an AP examination; see the Credit Toward Degree column heading. How those units will be applied toward specific degree requirements in each college is explained for each exam category. Please note that the courses for which AP credit has been granted may not be used as a substitute for courses required as part of the UC Davis General Education Requirement; see General Education Requirement, on page 95.

In general, you may not earn university credit for college courses or International Baccalaureate (IB) transfer credit that duplicate credit already earned through AP. There are, however, a few exceptions to this general rule. Since it is often difficult to know exactly which UC Davis course you should take when you have earned AP credit, you should talk with an academic adviser in your major department or dean's office before selecting and enrolling in classes.

International Baccalaureate (IB) Examinations

UC Davis recognizes the International Baccalaureate examinations for college credit. Higher Level examinations presented with scores of 5, 6 or 7 receive degree credit and in specific instances are deemed comparable to various lower-division courses. Students completing the International Baccalaureate (IB) diploma with a score of 30 or above will receive a maximum of 30 quarter (20 semester) units. The credit will apply toward the minimum 180 quarter units needed to receive a bachelor's degree.

See International Baccalaureate (IB) Higher Level Examination Credit, on page 39, to learn how many units you may receive for an acceptable IB examination. The table also specifies which UC Davis lower-division course an IB examination is comparable to. Please note that the courses for which IB credit have been granted may not be used as a substitute for courses required as part of the UC Davis General Education Requirement; see General Education Requirement, on page 95.

In general, you may not earn university credit for college courses that duplicate credit earned through IB. Similarly, students will not receive duplicate credit for comparable AP examinations if granted IB transfer credit. Additionally, each college may have special restrictions on the use of IB examinations. Please check with your dean's office and department adviser to determine any restrictions in their use toward breadth requirements and lower-division major course requirements before selecting and enrolling in classes.

ADMISSION AS A TRANSFER STUDENT

The University of California defines a transfer applicant as a student who has been a registered student in a regular term at a college, university or in college-level extension classes since graduating from high school. Summer session attended immediately following high school graduation is excluded in this determination. If you are a transfer applicant, you may not disregard any of your college records and apply for admission as a freshman.

California residents must meet the requirements that follow. If you are not a California resident, see UC Freshman Eligibility for Non-California Residents, above.

UC Davis gives highest priority to junior-level transfer applicants from California community colleges. To apply to majors in the Colleges of Biological Sciences, Engineering and Letters and Science, students must be junior-level applicants with a minimum of 90 quarter (60 semester) units of transferable coursework, including courses in progress or planned. In the College of Agricultural and Environmental Sciences, junior-level applicants will be given highest priority, but lower-division applicants may be considered if space allows.

Meeting the transfer minimum eligibility requirements for UC qualifies you for admission to a UC campus, but does not guarantee admission to UC Davis. Due to limited enrollment space, transfer applicants who are admitted generally well exceed UC eligibility criteria. Foremost is the applicant's academic performance and preparation for the selected college and major. To be competitive, you must maintain a GPA of 2.80 or higher. In some cases, personal characteristics, experiences and circumstances will also be considered.

Applications far exceed the number of spaces available in majors such as biological sciences, biotechnology, communication, engineering, international relations, psychology and viticulture and enology. Applicants must complete specific lower-division preparation courses with a specific GPA in the major and an overall required GPA.

To see our selective majors and their specific requirements for admission, please see *http://admissions.ucdavis.edu/admission/tr_select_majors*.

College Board Advanced Placement (AP) Examination Credit

Examination [1]	Score	Credit Toward Degree; Quarter Units	UC Eligibility Area [2]	IGETC Area [3]	UC Davis Course Equivalencies	Full Credit Allowed for UC Davis Course Equivalencies [4]	Continuing UC Davis Course	UC Davis Area [5]	COLLEGE OF [6] Agricultural and Environmental Sciences	Biological Sciences	Engineering	Letters and Science	Comment *
Art History	5	8	UC-H	3A or 3B	Art History 1A, 1B, 1C	No	–	HU	–	a	–	a	–
Art History	4, 3	8	UC-H	3A or 3B	–	–	–	HU	–	–	–	–	–
Biology	5, 4, 3	8	UC-S	5B w/ lab	Biological Sciences 10	No	–	NS	–	–	–	b	• Biological Sciences 2A is the first course taken by most students majoring in the Life Sciences.
Chemistry	5	8	UC-S	5A w/ lab	Chemistry 2A	Yes*	Consult w/ adviser	NS	–	–	–	b	* Although Chemistry 2A may be taken for full credit, students are strongly encouraged to enroll in the 2AH, 2BH, 2CH sequence.
Chemistry	4, 3	8	UC-S	5A w/ lab	Chemistry 10	No	–	NS	–	–	–	b	–
Chinese Language and Culture	5, 4, 3	8	UC-H	3B and 6A	–	–	Consult w/ adviser	FL	–	f	–	f	–
Comparative Government and Politics	5, 4, 3	4	UC-B	4H	Political Science 2	No	–	SS	–	–	–	–	–
Computer Science A	5, 4, 3	2*	–	–	–	–	–	NS	–	–	–	b	* 4 transferable unit max. for both Computer Science exams.
Computer Science AB	5, 4	4*	–	–	Engineering Computer Science 30	No	Engineering Computer Science 40*	NS	–	–	–	b	* 4 transferable unit max. for both Computer Science exams. • Credit for Computer Science and Engineering 30 may fulfill prerequisite for Computer Science and Engineering 40 w/ instructor consent.
Computer Science AB	3	4*	–	–	–	–	–	NS	–	–	e	b	* 4 transferable unit max. for both Computer Science exams.
English - Language and Composition	5, 4	8*	UC-E	1A	English 3, University Writing Program 1	No	–	EN	d	c	–	d	* 8 transferable unit max. for all English exams. • Satisfies university Entry Level Writing Requirement.
English - Language and Composition	3	8*	UC-E	1A	–	–	–	EN	–	–	–	–	* 8 transferable unit max. for all English exams. • Satisfies university Entry Level Writing Requirement.
English - Literature and Composition	5, 4	8*	UC-E / H	1A or 3B	English 3, University Writing Program 1	No	–	EN	d	c	–	d	* 8 transferable unit max. for all English exams. • Satisfies university Entry Level Writing Requirement.
English - Literature and Composition	3	8*	UC-E / H	1A or 3B	–	–	–	EN	–	–	–	–	* 8 transferable unit max. for all English exams. • Satisfies university Entry Level Writing Requirement.
Environmental Science	5, 4, 3	4	UC-S	5A w/ lab	–	–	–	NS	–	–	–	b	–
European History	5, 4, 3	8	UC-B / H	3B or 4F	History 4B, 4C	4A, 4B: Yes; 4C: No	–	HU	–	–	–	–	–
French Language	5	8	UC-H	3B and 6A	French 22	No	French 23 or consult w/ adviser	FL	–	f	–	f	–
French Language	4	8	UC-H	3B and 6A	French 21	No	French 22	FL	–	f	–	f	–
French Language	3	8	UC-H	3B and 6A	French 3	No	French 21	FL	–	f	–	f	–
French Literature	5, 4, 3	8	UC-H	3B and 6A	upper division	No	French 100 or consult w/ adviser	FL	–	f	–	f	–
German Language	5	8	UC-H	3B and 6A	German 21	No	German 22 or consult w/ adviser	FL	–	f	–	f	–
German Language	4	8	UC-H	3B and 6A	German 20	No	German 21 or consult w/ adviser	FL	–	f	–	f	–

College Board Advanced Placement (AP) Examination Credit

Examination [1]	Score	Credit Toward Degree; Quarter Units	UC Eligibility Area [2]	IGETC Area [3]	UC Davis Course Equivalencies	Full Credit Allowed for UC Davis Course Equivalencies [4]	Continuing UC Davis Course	UC Davis Area [5]	COLLEGE OF [6] Agricultural and Environmental Sciences	Biological Sciences	Engineering	Letters and Science	Comment *
German Language	3	8	UC-H	3B and 6A	German 3	No	German 20 or consult w/ adviser	FL	–	f	–	f	–
Human Geography	5, 4, 3	4	UC-B	4E	–	–	–	SS	–	–	–	–	–
Italian Language and Culture	5, 4, 3	8	UC-H	3B and 6A	–	–	Consult w/ adviser	FL	–	f	–	f	–
Japanese Langugae and Culture	5, 4, 3	8	UC-H	3B and 6A	–	–	Consult w/ adviser	FL	–	f	–	f	–
Latin (Vergil)	5, 4, 3	4	UC-H	3B and 6A	Latin 2	No	Consult w/ Classics adviser	FL	–	f	–	f	–
Latin Literature	5, 4, 3	4	UC-H	3B and 6A	–	–	Consult w/ Classics adviser	FL	–	f	–	f	–
Macroeconomics	5, 4, 3	4	UC-B	4B	Economics 1B	No	Economics 101	SS	–	–	–	–	–
Mathematics - Calculus AB	5, 4	4*	UC-M	2A	Mathematics 12, 16A, 17A or 21A	12: No; 16A, 17A, 21A: Yes	Mathematics 16B, 17B or 21B	NS	–	–	–	b	* 8 transferable unit max. for all Mathematics-Calculus exams. • Credit for Mathematics 16A, 17A or 21A equivalents may fulfill prerequisite for Mathematics 16B, 17B or 21B. • If student elects to register in Mathematics 12, 16A, 17A or 21A, s/he is subject to the Mathematics Placement Requirement (MPR). For details, visit math.ucdavis.edu/undergrad/math_placement/
Mathematics - Calculus AB	3	4*	UC-M	2A	–	–	Mathematics 16A, 17A or 21A	NS	–	–	–	b	* 8 transferable unit max. for all Mathematics-Calculus exams. • If student elects to register in Mathematics 12, 16A, 17A or 21A, s/he is subject to the Mathematics Placement Requirement (MPR). For details, visit math.ucdavis.edu/undergrad/math_placement/
Mathematics - Calculus BC	5	8*	UC-M	2A	Mathematics 12, 16A-16B, 17A-17B or 21A-21B	12: No; 16A, 16B, 17A, 17B, 21A, 21B: Yes	Mathematics 16C, 17C or 21C	NS	–	–	–	b	* 8 transferable unit max. for all Mathematics-Calculus exams. • Mathematics 16A, 16B, 17A, 17B, 21A or 21B equivalents may fulfill prerequisites for Mathematics 16B, 16C, 17B, 17C, 21B or 21C. • If student elects to register in Mathematics 12, 16A, 17A or 21A, s/he is subject to the Mathematics Placement Requirement (MPR). For details, visit math.ucdavis.edu/undergrad/math_placement/
Mathematics - Calculus BC	4, 3	8*	UC-M	2A	Mathematics 12, 16A, 17A or 21A	12: No; 16A, 17A, 21A: Yes	Mathematics 16B, 17B or 21B	NS	–	–	–	b	* 8 transferable unit max. for all Mathematics-Calculus exams. • Credit for Mathematics 16A, 17A or 21A equivalents may fulfill prerequisite for Mathematics 16B, 17B or 21B. • If student elects to register in Mathematics 12, 16A, 17A or 21A, s/he is subject to the Mathematics Placement Requirement (MPR). For details, visit math.ucdavis.edu/undergrad/math_placement/
Microeconomics	5, 4, 3	4	UC-B	4B	Economics 1A	No	Economics 100	SS	–	–	–	–	–
Music Theory	5, 4, 3	8	UC-H	–	Music 10	No	–	HU	–	a	–	a	–
Physics B	5,4	8*	UC-S	5A w/ lab	Physics 1A, 1B	No	–	NS	–	–	–	b	* 8 transferable unit max. for all three Physics exams.
Physics B	3	8*	UC-S	5A w/ lab	–	–	–	NS	–	–	–	b	* 8 transferable unit max. for all three Physics exams.
Physics C1-Mechanics	5,4	4*	UC-S	5A w/ lab	Physics 1A	No	–	NS	–	–	–	b	* 8 transferable unit max. for all three Physics exams.
Physics C1-Mechanics	3	4*	UC-S	5A w/ lab	–	–	–	NS	–	–	–	b	* 8 transferable unit max. for all three Physics exams.
Physics CII-Electricity/Magnetism	5, 4	4*	UC-S	5A w/ lab	–	–	–	NS	–	–	–	b	* 8 transferable unit max. for all three Physics exams.
Physics CII-Electricity/Magnetism	3	4*	UC-S	5A w/ lab	–	–	–	NS	–	–	–	b	* 8 transferable unit max. for all three Physics exams.
Psychology	5	4	UC-B	4I	Psychology 1	No	–	SS	–	–	–	–	–

College Board Advanced Placement (AP) Examination Credit

Examination [1]	Score	Credit Toward Degree; Quarter Units	UC Eligibility Area [2]	IGETC Area [3]	UC Davis Course Equivalencies	Full Credit Allowed for UC Davis Course Equivalencies [4]	Continuing UC Davis Course	UC Davis Area [5]	COLLEGE OF [6] Agricultural and Environmental Sciences	Biological Sciences	Engineering	Letters and Science	Comment *
Psychology	4, 3	4	UC-B	4I	–	–	–	SS	–	–	–	–	–
Spanish Language	5	8	UC-H	3B and 6A	Spanish 23	No	Spanish 24 or consult w/ adviser	FL	–	f	–	f	–
Spanish Language	4	8	UC-H	3B and 6A	Spanish 22	No	Spanish 23 or consult w/ adviser	FL	–	f	–	f	–
Spanish Language	3	8	UC-H	3B and 6A	Spanish 21	No	Spanish 22 or consult w/ adviser	FL	–	f	–	f	–
Spanish Literature	5, 4	8	UC-H	3B and 6A	Spanish 24	No	Spanish 100 or consult w/ adviser	FL	–	f	–	f	–
Spanish Literature	3	8	UC-H	3B and 6A	Spanish 23	No	Spanish 24 or consult w/ adviser	FL	–	f	–	f	–
Statistics	5, 4	4	UC-M	2A	Statistics 13	Yes	–	NS	–	–	–	b	–
Statistics	3	4	UC-M	2A	–	–	–	NS	–	–	–	b	–
Studio Art [Drawing Portfolio; 2-D Design Portfolio; 3-D Design Portfolio]	5	8*	–	–	Art Studio 2, 5	No	–	HU	–	a	–	a	* 8 transferable unit max. for all three Studio Art exams.
Studio Art [Drawing Portfolio; 2-D Design Portfolio; 3-D Design Portfolio]	4	8*	–	–	Art Studio 2	No	–	HU	–	a	–	a	* 8 transferable unit max. for all three Studio Art exams.
Studio Art [Drawing Portfolio; 2-D Design Portfolio; 3-D Design Portfolio]	3	8*	–	–	–	–	–	HU	–	–	–	–	* 8 transferable unit max. for all three Studio Art exams.
United States Government and Politics	5, 4, 3	4	UC-B	4H	Political Science 1	No	–	SS	–	–	–	–	• Satisfies university American History and Institutions requirement.
United States History	5, 4, 3	8	UC-B / H	3B or 4F	History 17A, 17B	Yes	–	HU	–	–	–	–	• Satisfies university American History and Institutions requirement.
World History	5, 4, 3	8	UC-B / H	3B or 4F	–	–	–	HU	–	–	–	–	–

Note: This is not a comprehensive list as new tests are possible. If your exam is not listed, it will be determined by adviser consultation.

UC Davis Pattern Of General Education:

[1] Exam:
- Exams discontinued after May 2009: Computer Science AB, French Literature, Italian, Latin Literature

[2] UC Eligibility Area:
- UC-B=Behavioral and Social Sciences, UC-E=English, UC-H=Humanities, UC-M=Math, UC-S=Biological and Physical Sciences
- UC-E: If English AP test score of 3, 4, 5 was achieved prior to completing any transferable English composition course(s), 8 qtr. units of transfer credit are awarded for the AP exam, and one of two English Composition requirements (UC-E) satisfied. UC Davis articulates (AP) English Language & Composition and English Literature & Composition with scores of 4 or 5 as UWP 1 and English 3 therefore we will not allow transfer credit for any duplicated English courses.
- See www.assist.org, Help Topics: UC Transfer Admis Eligibility for details related to UC Transfer Admissions Eligibility Courses.

[3] IGETC Area:
- Each AP exam may be applied to one IGETC area as satisfying one course requirement, with the exception of Language other than English (LOTE).
- There is no equivalent AP exam for the Area 1B - Critical Thinking/Composition requirement.
- For details regarding IGETC certification, see your California community college adviser and www.assist.org, Help Topics: IGETC. Students entering UC Davis with partial IGETC certification should contact their dean's office.

[4] Full Credit Allowed for UC Davis Course Equivalencies/Duplicate Credit :
- Students should be aware that AP exams, IB exams and college courses taken prior to or after enrolling at the university may be duplicative. In these cases, the university will award credit for only one of these. In general, you may not earn university credit for college courses that duplicate credit already earned through AP. There are, however, a few exceptions to this general rule. Since it is often difficult to know exactly which UC Davis course you should taken when you have earned AP credit, you should talk with an academic adviser in your major department or dean's office before selecting and enrolling in classes.

[5] UC Davis Area:
HU=Humanities FL=Foreign Languages EN=English
NS=Natural Sciences SS=Social Science

[6] UC Davis College Area Requirements:
a. Partially satisfies Area (breadth) requirements for the A.B. degree.
b. 4 units of credit toward Natural Sciences Credit or Preparatory Course Work allowed for science majors for each Natural Sciences exam passed, except 8 units of credit allowed for Mathematics BC and Physics B exams.
c. Satisfies 4 lower-division units of the English Composition requirement.
d. Satisfies first course toward English Composition requirement.
e. Exam awards units toward the Unrestricted Electives requirement.
f. Languge exams (except for Latin), and the Literature exams in French and Spanish, satisfy the Foreign Language requirement. Until otherwise determined the Language and Culture exams do not satisfy the Foreign Language requirement.

NOTE: Courses for which AP credit has been granted may not be used as a substitute for courses required as part of the UC Davis General Education Requirement; see Advanced Placement (AP) Examinations, on page 35 and page 41.

International Baccalaureate (IB) Higher Level Examination Credit

Examination	IB Area	Score	Credit Toward Degree; Quarter Units	IGETC Area [1]	UC Davis Course Equivalencies [2]	Continuing UC Davis Course	UC Davis Area [3]	COLLEGE OF [4] Agricultural and Environmental Sciences	Biological Sciences	Engineering	Letters and Science	Comment
Africas	History	5, 6, 7	8	3B or 4F	–	–	HU	–	–	–	–	
Americas	History	5, 6, 7	8	3B or 4F	History 17A, 17B	Determined by dept. or major adviser	HU	–	–	–	–	Satisfies the university American History and Institutions requirement
Biology	–	5, 6, 7	8	5B w/o lab	Biological Sciences 10	–	NS	–	–	–	g, h	
Business and Management	–	5, 6, 7	8	–	–	Determined by dept. or major adviser	SS	–	–	–	–	
Chemistry	–	5, 6	8	5A w/o lab	Chemistry 10	–	NS	–	–	–	g, h	
Chemistry	–	7	8	5A w/o lab	Chemistry 2A	–	NS	–	–	–	g, h	
Classical Greek	Classical Languages	5, 6, 7	8	–	–	–	FL	–	–	–	–	
Computer Science	–	5, 6, 7	8	–	–	–	NS	–	–	–	g, h	
Dance	–	5, 6, 7	8	–	–	–	HU	–	–	–	–	
Design Technology	–	5, 6, 7	8	–	–	–	HU	–	–	–	–	
East / South Asia and Oceania	History	5, 6, 7	8	3B or 4F	–	–	HU	–	–	–	–	
Economics	–	5, 6, 7	8	4B	Economics 1A and 1B	Determined by dept. or major adviser	SS	–	–	–	–	
English A1	English	5, 6, 7	8	3B	English 3	Determined by dept. or major adviser	EN	a	b	–	c	• Satisfies the university Entry Level Writing Requirement • A score of 6 or higher on the Standard Level (SL) A1 English exam also satisfies the university Entry Level Writing Requirement, though it does not result in any course credit.
English A2	English	5, 6, 7	8	3B	–	–	EN	–	–	–	–	
English B	English	5, 6, 7	8	–	–	–	EN	–	–	–	–	
Europe	History	5, 6, 7	8	3B or 4F	History 4C	Determined by dept. or major adviser	HU	–	–	–	–	
Film	–	5, 6, 7	8	–	–	–	HU	–	–	–	–	
French A1	A1 (native language; for English see "English" above)	5, 6, 7	8	3B and 6A	French 21, 22, 23	Determined by dept. or major adviser	FL	–	e	–	e	
French A2	A2 (second language; for English see "English" above)	5, 6, 7	8	3B and 6A	French 21, 22	Determined by dept. or major adviser	FL	–	e	–	e	
French B	B (non-native language; for English, see "English" above)	5, 6, 7	8	6A	French 1, 2, 3	Determined by dept. or major adviser	FL	–	e	–	e	
Geography	–	5, 6, 7	8	4E	–	–	SS	–	–	–	–	
German A1	A1 (native language; for English see "English" above)	5, 6, 7	8	3B and 6A	German 1, 2	Determined by dept. or major adviser	FL	–	–	–	–	
German A2	A2 (second language; for English see "English" above)	5, 6, 7	8	3B and 6A	German 1, 2	Determined by dept. or major adviser	FL	–	–	–	–	
German B	B (non-native language; for English, see "English" above)	5, 6, 7	8	6A	German 1, 2	Determined by dept. or major adviser	FL	–	–	–	–	
Islamic World	History	5, 6, 7	8	3B or 4F	History 6	Determined by dept. or major adviser	HU	–	–	–	–	
Italian A1	A1 (native language; for English see "English" above)	5, 6, 7	8	3B and 6A	Italian 4, 5	Determined by dept. or major adviser	FL	–	e	–	e	

International Baccalaureate (IB) Higher Level Examination Credit

Italian A2	A2 (second language; for English see "English" above)	5, 6, 7	8	3B and 6A	–	–	FL	–	–	–	–	
Italian B	B (non-native language; for English, see "English" above)	5, 6, 7	8	6A	–	–	FL	–	–	–	–	
Latin	Classical Languages	5, 6, 7	8	–	Latin 1, 2, 3	Determined by dept. or major adviser	FL	–	e	–	e	
Mathematics	–	6, 7	8	2A	Math 21A, 21B (credit for one math series only)	Determined by dept. or major adviser	NS	–	–	–	g, h	If student elects to register in Mathematics 12, 16A, 17A or 21A, s/he is subject to the Mathematics Placement Requirement (MPR). For details, visit math.ucdavis.edu/undergrad/math_placement/
Mathematics	–	5, 6, 7	8	2A	Math 17A, 17B (credit for one math series only)	Determined by dept. or major adviser	NS	–	–	–	g, h	If student elects to register in Mathematics 12, 16A, 17A or 21A, s/he is subject to the Mathematics Placement Requirement (MPR). For details, visit math.ucdavis.edu/undergrad/math_placement/
Mathematics	–	5, 6, 7	8	2A	Math 16A, 16B (credit for one math series only)	Determined by dept. or major adviser	NS	–	–	–	g, h	If student elects to register in Mathematics 12, 16A, 17A or 21A, s/he is subject to the Mathematics Placement Requirement (MPR). For details, visit math.ucdavis.edu/undergrad/math_placement/
Music	–	5, 6, 7	8	–	Music 10	Determined by dept. or major adviser	HU	–	f	–	f	
Philosophy	–	5, 6, 7	8	–	Philosophy 1	Determined by dept. or major adviser	SS	–	–	–	–	
Physics	–	5, 6, 7	8	5A w/o lab	Physics 1AB or 10	Determined by dept. or major adviser	NS	–	–	–	g, h	
Portuguese A1	A1 (native language; for English see "English" above)	5, 6, 7	8	3B and 6A	–	–	FL	–	–	–	–	
Portuguese A2	A2 (second language; for English see "English" above)	5, 6, 7	8	3B and 6A	–	–	FL	–	–	–	–	
Portuguese B	B (non-native language; for English, see "English" above)	5, 6, 7	8	6A	–	–	FL	–	–	–	–	
Psychology	–	5, 6, 7	8	4I	Psychology 1	Determined by dept. or major adviser	SS	–	–	–	–	
Social & Cultural Anthropology	–	5, 6, 7	8	–	–	Determined by dept. or major adviser	SS	–	–	–	–	
South Asia and the Middle East	History	5, 6, 7	8	3B or 4F	–	–	HU	–	–	–	–	
Spanish A1	A1 (native language; for English see "English" above)	5, 6, 7	8	3B and 6A	Spanish 28	Determined by dept. or major adviser	FL	–	e		e	
Spanish A2	A2 (second language; for English see "English" above)	5, 6, 7	8	3B and 6A	–	–	FL	–	–	–	–	
Spanish B	B (non-native language; for English, see "English" above)	5, 6, 7	8	6A	–	–	FL	–	–	–	–	
Theatre Arts	–	5, 6, 7	8	3A	–	–	HU	–	–	–	–	
Visual Arts	–	5, 6, 7	8	–	–	–	HU	–	–	–	–	
IB Diploma	–	30 pts. or higher	30	–	–	–	–	–	–	–	–	

Note: This is not a comprehensive list as new tests are possible. If your exam is not listed, it will be determined by adviser consultation.

UC Davis Pattern of General Education:

[1] IGETC Area:
- For details regarding IGETC certification, see your California community college adviser and www.assist.org, Help Topics: IGETC. Students entering UC Davis with partial IGETC certification should contact their dean's office.

[2] UC Davis Course Equivalencies / Duplicate Credit / Credit Limitations
- Students should be aware that IB exams, AP exams and college courses taken prior to or after enrolling at the university may be duplicative. In these cases, the university will award credit for only one of these. In general, you may not earn university credit for college courses that duplicate credit already earned through IB. There are, however, a few exceptions to this general rule.
- Each college may have special restrictions on the use of IB exams. Please check with your dean's office and department adviser to determine any restrictions in thier use toward breadth requirements and lower-division major course requirements.
- A student may receive eight units maximum for Higher Level IB exams that are duplicative.

[3] UC Davis Area:
HU=Humanities FL=Languages EN=English
NS=Natural Sciences SS=Social Science

[4] UC Davis College Area Requirements:
a. Satisfies first half of English Composition requirement.
b. Satisfies 4 lower-division units of the English Composition requirement.
c. Exam A1 satisfies first course toward English Composition requirement.
d. French and Latin exams satisfy the Foreign Language requirement for A.B. degree.
e. Foreign Language requirement (A.B. degree) satisfied by the following exams: French A1, A2, B; Italian A1, Latin, Spanish A1.
f. Music exam partially satisfies Area (Breadth) requirement for A.B. degree.
g. 4 units of credit toward Natural Sciences.
h. Credit or Preparatory Course Work allowed for science majors for each Natural Sciences exam passed, except 8 units of credit allowed for Mathematics and Physics exams.

NOTE: Courses for which IB credit have been granted may not be used as a substitute for courses required as part of the UC Davis General Education Requirements; see International Baccalaureate (IB) Examinations, on page 35 and page 41.

UC Transfer Eligibility for California Residents

To be minimally eligible for admission to UC as a junior transfer student, you must fulfill both of the following criteria:

1. Complete 90 quarter (60 semester) units of transferable credit with a minimum 2.40 GPA. No more than 21 quarter (14 semester) units may be taken Pass/No Pass.
2. Complete the following seven transferable college courses, earning a grade of *C*, or better, in each course:
   - Two courses in English composition;
   - One course in mathematical concepts and quantitative reasoning;
   - Four courses chosen from at least two of these subject areas: arts and humanities, social and behavioral sciences, and physical and biological sciences.

Each course must be worth at least 4-5 quarter (3 semester) units. Completing the IGETC before transferring to UC may satisfy the required seven-course pattern for UC eligibility, depending on the courses you take. For more information, see *http://www.assist.org*.

Alternatives for UC Transfer Minimum Eligibility

If you were eligible for admission to UC when you graduated from high school—meaning you satisfied the subject, scholarship and examination requirements, or were identified by UC during the senior year as Eligible in the Local Context (ELC)—you are eligible to transfer if you have a *C* (2.00) average in your transferable college coursework.

If you met the Scholarship Requirement in high school, but did not satisfy the 15-course Subject Requirement, you must take transferable college courses in the missing subjects, earn a *C* or better in each required course and maintain a 2.00 GPA to be eligible to transfer.

UC Transfer Eligibility for Non-California Residents

The minimum eligibility requirements for nonresident transfer applicants are very similar to those for residents. Nonresidents must have a GPA of 2.80 or higher in all transferable college coursework.

Transfer Credit

Coursework from other colleges and universities is considered transferable if the applicant completed the course at an institution that is recognized by the University of California. In addition, the coursework must be comparable to courses offered within the University of California.

A total of 105 quarter (70 semester) transferable units toward a university degree may be earned at a community (two-year) college. You can find information about transferable credit from California community colleges at *http://www.assist.org*. Only subject credit will be granted for courses taken in excess of this amount.

If you have completed 120 quarter (80 semester) units or more of transferable community and/or four-year college units, your admission is subject to approval by the respective dean for majors in the College of Agricultural and Environmental Sciences, College of Biological Sciences and College of Letters and Science.

Advanced Placement (AP) Examinations

If you take a College Board Advanced Placement examination and score 3, 4 or 5, you will be awarded college credit. The credit will become part of the minimum 180 quarter units you need in order to receive a bachelor's degree. The credit from the AP examinations may also be used to satisfy specific degree requirements.

See Advanced Placement (AP) Examinations, on page 41, to learn how many units you may receive for an AP examination; see the Credit Toward Degree column heading. How those units will be applied toward specific degree requirements in each college is explained for each exam category. Please note that the courses for which AP credit has been granted may not be used as a substitute for courses required as part of the UC Davis General Education Requirement; see General Education Requirement, on page 95.

In general, you may not earn university credit for college courses that duplicate credit already earned through AP. There are, however, a few exceptions to this general rule. Since it is often difficult to know exactly which UC Davis course you should take when you have earned AP credit, you should talk with an academic adviser in your major department or dean's office before selecting and enrolling in classes.

International Baccalaureate (IB) Examinations

UC Davis recognizes the International Baccalaureate examinations for college credit. Higher Level examinations presented with scores of 5, 6 or 7 receive degree credit and in specific instances are deemed comparable to various lower-division courses. Students completing the International Baccalaureate (IB) diploma with a score of 30 or above will receive a maximum of 30 quarter (20 semester) units. The credit will apply toward the minimum 180 quarter units needed to receive a bachelor's degree.

See International Baccalaureate (IB) Higher Level Examination Credit, on page 39, to learn how many units you may receive for an acceptable IB examination. The table also specifies which UC Davis lower-division course an IB examination is comparable to. Please note that the courses for which IB credit have been granted may not be used as a substitute for courses required as part of the UC Davis General Education Requirement; see General Education Requirement, on page 95.

In general, you may not earn university credit for college courses that duplicate credit earned through IB. Similarly, students will not receive duplicate credit for comparable AP examinations if granted IB credit. Additionally, each college may have special restrictions on the use of IB examinations. Please check with your dean's office and department adviser to determine any restrictions in their use toward breadth requirements and lower-division major course requirements before selecting and enrolling in classes.

Limited Status

Students in limited status are those whose special achievements qualify them to take certain university courses toward a definite and limited objective. Students will not be admitted to limited status for the purpose of raising a low scholarship average. Limited status students must either have a bachelor's degree (and not be a candidate for an advanced degree), or have completed a substantial amount of college work with a satisfactory grade point average.

As a limited status student, you will be expected to maintain a certain scholarship standing during a predetermined period of enroll-

ment. As an alternative to applying for limited status admission, you may wish to consider enrolling in our UC Davis Extension Open Campus program.

Currently the Colleges of Agricultural and Environmental Sciences, Biological Sciences, Engineering and Letters and Science do not accept limited status applicants

Second Baccalaureate

If you have a bachelor's degree substantially equivalent to one granted by the University of California, you may enroll as an undergraduate seeking a second bachelor's degree. Admission under this status will require a superior academic record and clear evidence of a change in objective. You must submit the online UC undergraduate application for admission and scholarships. Application filing dates are the same as those for new undergraduate applicants.

Second baccalaureate degree applicants for 2011-12 will be considered only in the following majors within the College of Agricultural and Environmental Sciences: biotechnology, (pre) landscape architecture, and viticulture and enology. Starting in 2012-13, the College of Agricultural and Environmental Sciences will no longer consider second baccalaureate applicants.

The College of Engineering will consider applicants if their first degree is not in engineering and if they complete the lower-division engineering program at a California community college. Admissions to the College of Agricultural and Environmental Sciences and College of Engineering require approval of the Undergraduate Admissions director and dean of the college. The Colleges of Biological Sciences and Letters and Science do not accept second baccalaureate applicants.

UC Intercampus Transfer

If you are an undergraduate student currently or previously registered at another UC campus and have not since been registered in a non-UC institution, you may apply for transfer to the UC Davis campus. Filing dates, the application, fees and admission requirements are the same as those listed for new transfer applicants.

ADMISSION AS AN INTERNATIONAL STUDENT

International students attend the University of California, Davis, from many countries around the world. There were over 100 different countries represented on the UC Davis campus in the 2008-2009 academic year, by an international student population of approximately 2,200 students, as well as approximately 2,500 international faculty and researchers.

International Freshman Applicants

Non-immigrants studying in the United States must meet the same requirements as domestic California and non-California residents. Students studying outside the United States must complete secondary school, earn superior marks in academic subjects, sit for the UC required exams and may be required to demonstrate English proficiency. For more information, see *http://admissions.ucdavis.edu/international*.

International Transfer Applicants

International students applying to transfer to UC Davis from California colleges or universities are considered for admission using the same eligibility criteria as domestic students. Applicants who have attended foreign and U.S. colleges and universities will be evaluated using courses and grades from both institutions.

Priority is given to prospective California community college transfer students who are prepared to begin their junior or third year of study. Coursework from other colleges and universities is considered transferable if the applicant completed the course at an institution that is recognized by the University of California. In addition, the coursework must be comparable to courses offered within the University of California. For more information, see *http://admissions.ucdavis.edu/international*.

Required International Academic Records

International students are responsible for providing UC Davis with official academic transcripts and/or certificates beginning with secondary school records. College and university records should indicate subjects taken; grades or marks earned; rank in class; number of academic terms per year; number of weeks in each academic term; and number of hours per week devoted to lecture and laboratory. Certifications must be provided for any university or government examinations the student has undertaken. Note: It is not possible to disregard any college or university work undertaken within the United States or abroad.

English Proficiency

Applicants must demonstrate English proficiency if they have been studying in the United States for less than two years, English is not their native language, and/or the language of instruction prior to study in the United States was not English. Applicants may demonstrate proficiency in one of the following ways:

- Complete two transferable college courses (3 semester or 4–5 quarter units each) in English composition with *C* grades or better at an accredited U.S. college or university.
- Achieve a minimum score of 550 on the paper-based Test of English as a Foreign Language (TOEFL) or 213 on the computer-based TOEFL or 80 on the Internet-based TOEFL. For more information, see *http://www.toefl.org*.
- Achieve a minimum score of 7 (academic module) on the International English Language Testing System (IELTS).
- Achieve a minimum score of 560 on the Writing component of the SAT Reasoning Test.

AFTER YOU APPLY FOR ADMISSION

A few weeks after you apply, the University of California will notify you that your application has been received and processed. UC Davis will also notify you once the application has been received at our campus. At this time you should use your UC Davis Student ID to create a MyAdmissions account online at *http://myadmissions.ucdavis.edu*. You will be able to use this secure website to check your application and admission status at our campus only.

Students admitted to UC Davis can use MyAdmissions to check deadlines and event dates, review their financial aid and scholarship awards (MyAwards) and accept our offer of admission. Admitted students who officially accept our offer of admission by

submitting their Statement of Intent to Register (SIR) will need to complete all pre-enrollment tasks, such as:

- MyAwards—Financial Aid Notice and Scholarships
- Student Housing
- Orientation (fall admits only)
- Statement of Legal Residence
- High School Transcripts
- College/University Transcripts
- AP/IB Examination Results
- Test Scores
- Requests for I-20 or DS-2019
- International Records
- Accommodation for a Disability (if applicable)
- Health Insurance Requirement
- Hepatitis B Statement

After applying, transfer students are required to update their grades and course records at the online UC Application Update (AU) to ensure that the campuses have the most current academic information available. For details and deadlines, see *http://www.universityofcalifornia.edu/admission/appupdate*.

Required Academic Records for All Students

You must report all AP and IB examinations, as well as any college/university work undertaken within the United States or abroad.

Freshman applicants are required to submit official scores for the following examinations:

- ACT plus Writing
  OR
- SAT Reasoning Test
  And
- SAT Subject Tests

For more information regarding ACT, see *http://www.act.org*; the UC Davis ACT code is 0454. For more information regarding SAT, see *http://www.collegeboard.org*; UC Davis College Board code is 004834.

If you are admitted to UC Davis, you are expected to arrange all of your official, final transcripts to be sent to Undergraduate Admissions. You do not need to submit official transcripts before this time, unless requested. All students must provide official, final:

- High school transcripts
- College transcripts

All students completing the following examinations will be required to submit official scores:

- Advanced Placement (AP)
- International Baccalaureate (IB)

International applicants will be required to submit official scores for the following examination:

- TOEFL
  OR
- IELTS

Submit official documents and test scores to:

Undergraduate Admissions
University of California
One Shields Avenue
Davis, CA 95616-8507

SPECIAL PROGRAMS

Deferred Enrollment

The Deferred Enrollment program allows newly admitted undergraduate students to postpone their initial enrollment at the university for up to one year. The purpose is to allow time to pursue other non-academic activities and opportunities that will assist students in clarifying their educational goals (e.g., travel, job opportunities, non-collegiate experience, time to resolve personal or medical problems). Students are not allowed to enroll in any coursework at another college or university during this time.

To be eligible for Deferred Enrollment, you must return your affirmative Statement of Intent to Register (SIR) with the deposit by the deadline, and must satisfy all university admission and entrance requirements. After submitting the SIR, you can browse our deferred enrollment FAQs and apply for deferred enrollment through MyAdmissions. You must also submit a $60 processing fee prior to the first day of instruction of the quarter to which you have been admitted.

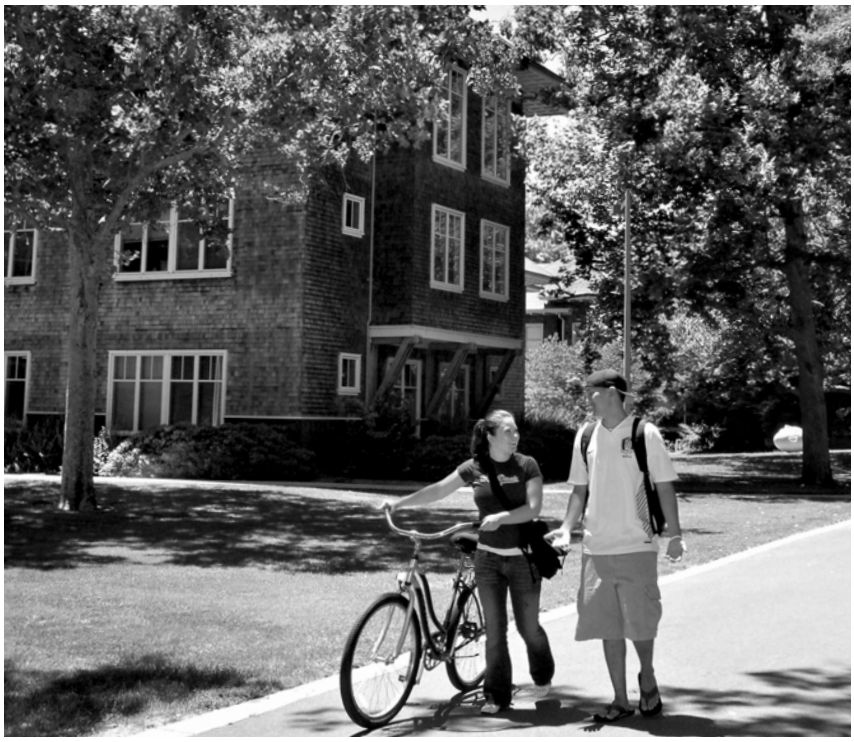
UNDERGRADUATE READMISSION

If you are a former UC Davis undergraduate student who wishes to resume undergraduate studies, you may reapply through the Readmission process. You are considered a former student if you have interrupted the completion of consecutive terms of enrollment on the UC Davis campus. For details regarding the Readmission process, see *http://registrar.ucdavis.edu/html/readmin.html*.

You may obtain the Readmission application from the Office of the University Registrar or download the application at *http://registrar.ucdavis.edu/PDFFiles/D064ApplUndergradReadmission.pdf*. The Readmission application must be completed and submitted to the Office of the University Registrar with the non-transferable, non-refundable $60 application fee on or before the following deadlines:

Quarter	Deadline Date
Fall 2010	~~Jul 31, 2009~~ Jul 30, 2010
Winter 2011	~~Oct 30, 2010~~ Oct 29, 2010
Spring 2011	~~Jan 30, 2010~~ Jan 31, 2011
Fall 2011	~~Jul 31, 2010~~ Jul 29, 2011
Winter 2012	~~Oct 30, 2011~~ Oct 31, 2011
Spring 2012	~~Jan 29, 2011~~ Jan 31, 2012

Fall: The last business day of July
Winter: The last business day of October
Spring: The last business day of January



FEES, EXPENSES AND FINANCIAL AID

FEES AND EXPENSES

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

The most up-to-date student fee information is available at *http://www.ormp.ucdavis.edu/studentfees*. Every student must pay the quarterly fees, and any amounts charged to the student account, in full by the fee payment deadline listed in the *Class Schedule and Registration Guide (CSRG)*. A Registration Fee Deferred Payment Plan (RFDPP), which allows students to pay quarterly fees in three monthly installments, or semester fees in four monthly installments, is available.

Course Materials Fees

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

Part-Time Students

Students approved for enrollment on a part-time basis pay the same fees as full-time students, but pay only one-half of the Educational Fee. Part-time nonresidents pay one-half of the Nonresident Tuition Fee. Part-time petitions should be filed with the

Student Fees

As a result of Regental, legislative, gubernatorial, and/or campus actions, these fees may change without notice. For up-to-date fee information, see *http://budget.ucdavis.edu/studentfees/*. Programs and courses may have fees that are not listed here, check with your advisor.

	Undergraduate[4]		Graduate		Law[1] (Semester)	Medicine	Management[3]	Veterinary Medicine	Master of Public Health[5]	Master of Preventive Veterinary Medicine[5]	Betty Irene Moore School of Nursing[6]
	Resident	Nonresident	Resident	Nonresident							
Registration Fee	$300.00	$300.00	$300.00	$300.00	$450.00	$300.00	$300.00	$300.00	$300.00	$300.00	$300.00
Educational Fee	$3,134.00	$3,420.00	$3,134.00	$3,270.00	$4,656.00	$3,104.00	$3,104.00	$3,104.00	$3,550.00	$3,550.00	$3,104.00
ASUCD Fee	$35.00	$35.00									
GSA Fee			$12.00	$12.00			$12.00		$12.00	$12.00	$12.00
LSA Fee					$30.00						
Memorial Union Fee	$28.50	$28.50	$28.50	$28.50	$42.75	$28.50	$28.50	$28.50	$28.50	$28.50	$28.50
Facilities and Campus Enhancements Fee	$133.60	$133.60	$133.60	$133.60		$133.60	$133.60	$133.60	$133.60	$133.60	$133.60
Legal Education Enhancement and Access Program Fee					$191.20						
Campus Expansion Initiative	$175.62	$175.62	$63.02	$63.02	$90.20	$63.02	$63.02	$63.02	$63.02	$63.02	$63.02
Student Services Maintenance Fee and Student Activities & Services Initiative Fee	$107.25	$107.25									
Student Facilities Safety Fee	$22.00	$22.00	$22.00	$22.00	$33.00	$22.00	$22.00	$22.00	$22.00	$22.00	$22.00
Student Health Services Fee	$44.00	$44.00	$44.00	$44.00	$66.00	$44.00	$44.00	$44.00	$44.00	$44.00	$44.00
Unitrans	$6.00	$6.00									
Health Insurance[2]	$374.00	$374.00	$683.00	$683.00	$1,023.50	$465.00	$683.00	$683.00	$683.00	$6,83.00	$683.00
Professional School Fee					$14,300.00	$4,383.00	$6,778.00	$4,888.00	$1,733.00	$1,427.00	$1,622.00
Disability Insurance Fee											
Veterinary Medicine Course Materials Fee								$817.00			
School of Medicine Course Materials Fee						$125.00					
Total Full-Time Student Fees, CA Resident	$4,359.97		$4,420.12		$20,882.65	$8,729.12	$11,168.12	$10,083.12	$6,569.12	$6,263.12	$6,012.12
Nonresident Tuition		$7,341.00		$4,898.00	$6,122.50	$4,082.00	$4,082.00	$4,082.00	$4,082.00	$4,082.00	$4,082.00
Total Full-Time Student Fees, Nonresident		$11,986.97		$9,454.12	$25,298.15	$12,811.12	$15,250.12	$14,165.12	$10,803.12	$10,497.12	$10,094.12
Total Part-Time Student, CA Resident	$2,792.97		$2,853.12								
Total Part-Time Student, Nonresident		$6,606.47		$5,370.12							
Total Employee-Student	$1,167.00		$1,067.00								

[1] The Law School operates on the semester system. Nonresident Law students pay a professional school fee of $12,593.00.

[2] Undergraduate and Graduate students are automatically in the Student Health Insurance Plan (SHIP) unless they are able to prove comparable coverage under another insurance plan. More information is available at *http://healthcenter.ucdavis.edu/insurance/*. Medical School students should contact the Office of Medical Education at (916) 734-4102 for information.

[3] Students enrolled in the Graduate School of Management Working Professionals Program pay a flat rate per course in lieu of the fees above. More information is available at *http://www.gsm.ucdavis.edu/*.

[4] A course materials fee may apply to some undergraduate and graduate courses. See the *Class Schedule and Registration Guide (CSRG)* or *http://budget.ucdavis.edu/studentfees/documents/special/course-materials-fees.pdf*.

[5] Nonresident Master of Public Health and Master of Preventive Veterinary Medicine students pay an Educational Fee of $3,702.00 per quarter.

[6] Professional School Fee for Betty Irene Moore School of Nursing only applies to Master's Degree students in the Nursing Science and Health-Care Leadership Program.

Office of the University Registrar in 12 Mrak Hall. The petitions must be filed on or before the 10th day of instruction for the term in which the reduction is to be applied.

UC Employee-Student Fees

Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the university. The employee-student must file a petition with the Office of the University Registrar in 12 Mrak Hall for the reduction of fees. The form must be filed on or before the 10th day of instruction for the term in which the reduction is to be applied. Employee-students pay one-third of the full-time Registration Fee and one-third of the full-time Education Fee. Employee-students also pay the Memorial Union Fee and the Student Facilities Safety Fee.

Employee students may enroll for up to nine units or three courses per quarter or semester, whichever is greater. Information is in *Personnel Policies for Staff Members* (section 51), available in department offices, at Shields Library, the Staff Development and Professional Services Office, and on the Internet. Petitions are also available on the Internet.

Motor Vehicle Parking Permit and Bicycle Licensing Fees

Parking permit rates are available on the TAPS website at *http://www.taps.ucdavis.edu* or call (530) 752-8277.

A California State bicycle license fee is required for all bicycles on campus (initial license, $10.00; renewals, $5.00). For more information, call (530) 752-2453.

Costs for a Year at UC Davis

The costs listed in Average Student Costs Annually, on page 47, are average costs and your own living expenses may differ somewhat from these. Cost of living expenses are adjusted annually and fees are subject to change without notice. More information on living expenses can be found in the section on housing or from the Financial Aid Office.

International Student Expenses

International students are responsible for all of their expenses while studying at UC Davis. The expenses include non-resident tuition, educational fees, room and board and a modest amount for personal expenses. For the 2009-2010 academic year, costs for undergraduate students were $49,097. Because the exact cost for tuition and fees is not determined until just before the beginning of the academic year, this amount is likely to increase without advance notice. For the latest costs, see *http://financialaid.ucdavis.edu/undergraduate/cost/UGBudgets.html*.

During the admission process, most international undergraduate students are required to complete the "Confidential Financial Statement" form certifying that funds are available for twelve months support. It is very important that students have adequate, reliable and continuing financial support for the whole time they are here. After students arrive in the United States, it is extremely difficult to obtain additional funding. The university does not offer grants or financial aid to international undergraduate students.

All students need to be aware that there are numerous initial expenses during the first few months, including tuition and fees, an initial down payment for housing, food and personal expenses. We suggest that you have a minimum of $10,500 available for immediate expenses. Careful budgeting is essential for international students.

FEE REFUNDS

Cancellation, Withdrawal and Fee Refunds

To cancel your registration before the first day of instruction or to withdraw from the university on or after the first day of instruction, you must complete a Cancellation/Withdrawal form and return the form to the Office of the University Registrar. If you do not submit a Cancellation/Withdrawal form, you will be liable for fees according to university policy (below). No exceptions will be made to this policy.

For students who pay fees and then cancel or withdraw with official approval before the end of any quarter, fees may be refunded according to the Schedule of Refunds, on page 47.

The effective date for determining a refund of fees is the date you file a completed Cancellation/Withdrawal form with the Office of the University Registrar and it is presumed that no university services will be provided to you after that date. The percentage of fees that may be refunded is determined by the number of calendar days (not school days) elapsed, beginning with the first day of instruction.

If you enrolled in classes, you will be dropped from all of your courses automatically when the Cancellation/ Withdrawal form is processed. If you enrolled but have not paid fees in full by the tenth day of instruction, you will be administratively withdrawn and fees for the first 10 days of instruction will be charged to your account.

New Undergraduate Students

The nonrefundable $100 deposit paid when you accepted admission and returned your Statement of Intent to Register (SIR) is withheld from the registration fee and the Schedule of Refunds is applied to the balance of fees assessed.

Thus, before or on the first day of instruction, registration fees paid are refunded in full minus $100. After the first day of instruction, the nonrefundable $100 deposit is withheld from the registration fee and the Schedule of Refunds is applied to the balance of fees assessed.

All Continuing Students, Readmitted Students and New Graduate Students

On or before the first day of instruction, registration fees are refunded in full minus a $10 service charge for cancellation/withdrawal. *After the first day of instruction*, the Schedule of Refunds is applied to the total of fees assessed.

Average Student Costs Annually

Undergraduate

Fees $11,984
Health Insurance $1,098
Books and supplies $1,601
Housing and Food $12,498
Personal expenses $1,356
Transportation $722
Total (on-campus residence) $29,259
Total (off-campus residence) $25,990
Graduate (single; living off campus) $28,110
Graduate School of Management (first/second year) .. $46,644
Graduate School of Management (evening program):
Sacramento:
$30,987–$32,895 entering and dependent on year admitted
Bay area:
$34,947–$37,467 entering and dependent on year admitted
School of Law ..... $58,053–$58,321
(depending upon the year in school)
School of Medicine $53,945–56,999
(depending upon the year in school)
Family Nurse Practitioner/Physician's Assistant (FNP/PA):
First year–$37,854; Second year–$36,025
Betty Moore School of Nursing:
Masters Program–$35,646 per year;
Ph.D. Program–$30,780 per year
School of Veterinary Medicine ..... $47,921–$54,526
(depending upon the year in school)

* Nonresident Fees & Tuition for Undergraduates: $34,863 (includes Systemwide fees $11,160, Campus Fees $1,682, and Non-resident Tuition $22,021.

NOTE: These costs are accurate as of March, 2010; however, they are subject to change when the California State budget passes in July. Students are advised to visit the Financial Aid website at *http://financialaid.ucdavis.edu* for the most current information.

Planned Educational Leave Program (PELP)

The Schedule of Refunds also applies to students who participate in the Planned Educational Leave Program (PELP). Thus, for a full refund of registration fees paid, you must file a completed approved PELP form with the Office of the University Registrar before or on the first day of instruction; see Leave of Absence: Planned Educational Leave Program (PELP), on page 84 in the Academic Information chapter.

Schedule of Refunds

The Schedule of Refunds applies to all continuing and readmitted students and new students who do not receive federal financial aid.*

The Schedule of Refunds refers to calendar days beginning with the first day of instruction. The number of days elapsed is determined from the date the completed Notice of Cancellation/Withdrawal form is returned to the Office of the University Registrar. Percentages listed (days 1-35) should be applied respectively to University Registration Fee, Educational Fee, Nonresident Tuition and other student fees.

Elapsed Calendar Days	Percentage of Fees Refunded
0–1	100% less $10.00
2–7 days	90%
8–18 days	50%
19–35 days	25%
36 days and over	0%

**New students who receive federal financial aid and withdraw during their first academic term may be refunded fees according to a Modified Fee Refund Schedule, available at the Financial Aid Office.*

Student Health Insurance Plan (SHIP) Coverage and Refund of SHIP Fees

Al l registered students are automatically enrolled in the Student Health Insurance Plan (SHIP) and are charged the SHIP fee. If you have comparable insurance and want to waive SHIP coverage, you must submit a waiver application at *http://healthcenter.ucdavis.edu/insurance* by the published deadline; see the Academic Calendar, on page 1. Waiver applications must be filed each academic year. An approved waiver is effective for the duration of the current academic year only.

Information regarding benefits, eligibility, deadlines, or insurance coverage if your registration status changes can be found at *http://healthcenter.ucdavis.edu/insurance/eligibility*.

FINANCIAL AID

Financial Aid Office
1100 Dutton Hall
(530) 752-2390 (530) 754-6073 (Hearing Impaired)
http://financialaid.ucdavis.edu

The Financial Aid Office provides financial assistance in the form of scholarships, loans, grants and Work-Study employment. To apply, undergraduates and graduate students are required to file the Free Application for Federal Student Aid (FAFSA), available at *http://www.fafsa.ed.gov*.

The priority-filing period is January 1 to March 2 each year; however, students are encouraged to apply even if the deadline has passed. Although state and university funding may be depleted, Federal Pell Grants and Direct Loans are available throughout the year for eligible applicants.

UC Education Finance Policy for Undergraduates

UC Davis uses the University of California Education Finance Policy to determine financial aid awards for undergraduates. The policy looks at four factors to choose the type and amount of aid for each student:

1. Cost of attendance
2. Expected Family Contribution (EFC) as assigned by the federal processor based on the FAFSA
3. Federal and state grant eligibility based on the FAFSA
4. Undergraduate Self-Help and Loan Contribution, which is the amount that undergraduates are expected to contribute toward their cost of education at UC Davis

The Financial Aid Office can assist students with dependents or child care costs that exceed the standard student budgets.

Undergraduates with outstanding academic records are encouraged to apply for scholarships. For information about scholarship applications, see Undergraduate Scholarships and Awards, on page 50.

Graduate Student Funding

Graduate students and students in the professional schools at UC Davis (Medicine, Law, Veterinary Medicine and the School of Management) apply for financial aid by completing the Free Application for Federal Student Aid (FAFSA). Financial need is based on the information provided on the FAFSA and the student is sent a Student Aid Report (SAR) with the Student Contribution (SC) assigned by the federal processor. The SC is subtracted from the UC Davis Student Expense Budget (for the student's graduate program) to determine need-based eligibility. Graduate scholarships, fellowships and teaching and research assistantships are administered through the Office of Graduate Studies.

Satisfactory Academic Progress

Federal regulations require that undergraduate and graduate student financial aid recipients meet the published Standards for Satisfactory Academic Progress for Financial Aid concerning units, grade point average and maximum quarters of attendance allowed to obtain a degree. A copy of these standards is available at *http://financialaid.ucdavis.edu/undergraduate/students/SAP.html*. Review the policy in detail and discuss it with your academic adviser.

For more information, contact the Financial Aid Office. Regulations and deadlines are subject to change.

Types of Financial Aid

Grants

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

Federal Pell Grants. All undergraduate financial aid applicants are required to apply for a Federal Pell Grant each year by filing the FAFSA. Recipients must be enrolled at full time to receive the full amount of awarded Pell Grant and must maintain good academic standing and make satisfactory academic progress. Eligibility is determined by the federal government according to a formula developed by the Department of Education and approved annually by Congress. The UC Davis electronic notice (MyAwards) informs the student of the Pell Grant award amount.

Cal Grants. All undergraduate financial aid applicants who are California residents are encouraged to apply for a Cal Grant by submitting the FAFSA and a GPA Verification form before March 2. Cal Grants are awarded by the California Student Aid Commission (CSAC) and may be renewed each year for four years. For more information, see *http://www.csac.ca.gov*.

- **Cal Grant A** awards are based on financial need and academic achievement and can be extended for one year for students entering a teaching credential program. Cal Grant A pays partial registration fees.
- **Cal Grant B** awards are based on financial need and are for undergraduate students primarily from low-income backgrounds. Recipients are required to complete at least 12 units each quarter. Cal Grant B pays a quarterly stipend for living expenses for first-year students and a portion of the registration fees plus a quarterly stipend for living expenses for students in their second through fourth years.

  Cal Grant A and B recipients who plan to enroll in a Teaching Credential Program (TCP) may be eligible to renew their Cal Grant award for an additional year. The additional year of payment is provided to students who are seeking an initial teaching credential and cannot be used for other graduate level courses of study.

University Grants (UC Grant). The university determines grant eligibility for undergraduates by subtracting a student and parent contribution, any federal or state resources the student receives, and a standard work and loan contribution from the cost of attendance. Any remaining eligibility would be funded with UC Grant. UC Grant funding for graduate students is awarded by the Office of Graduate Studies. Students in the professional schools and the School of Education are awarded grant by their academic departments.

Note: the ACG and SMART grants will be discontinued after 2011. The Academic Competitive Grant (ACG) makes funds available for low income college students who meet the general Pell Grant program guidelines, as well as additional specific criteria. ACG is awarded to first and second year college students who have successfully completed a rigorous secondary school program.

The National Science and Mathematical Access to Retain Talent (SMART) Grants are federal funds awarded to third and fourth year college students who are majoring in specific majors recognized by the U.S. Department of Education such as mathematics, science, technology, engineering, or critical foreign languages. In addition, to receive this grant the student must be a U.S. citizen, eligible for Pell Grant funding, attending full-time (enrolled in 12 or more units per quarter), and maintaining a 3.000 GPA.

For more details about ACG and SMART grants, see *http://financialaid.ucdavis.edu/undergraduate/types/ACG_SMART.html*.

Bureau of Indian Affairs (BIA) Grants are awarded to students who are at least one-fourth American Indian, Eskimo or Aleut as recognized by a tribal group served by the Bureau of Indian Affairs and who show financial need. Applicants must submit a Free Application for Federal Student Aid (FAFSA) and provide supporting documents. Students are advised to write to the agency that administers their tribal affairs to request a BIA Higher Education Assistance application. The BIA Financial Aid officer on campus can help complete the application. The amount of BIA grant depends on need and availability of funds at each BIA agency.

Loans

Financial Aid almost always includes a long-term loan. Awards are dependent on funding available. Some loan fund sources do not receive allocations each year. Repayment of these loans (with the exception of Federal Direct PLUS loans) begins after graduation or withdrawal from school. Students are encouraged to work as much as possible (while remaining full-time students) and to develop modest personal budgets to keep final loan indebtedness within a manageable range.

Health Profession Student Loans (HPSL) are awarded to students in the School of Veterinary Medicine who demonstrate financial need. Parental income information is required for HPSL applicants regardless of age and dependency status.

- $2,500 plus fees maximum
- 5% interest
- Repayment begins twelve months after receipt of the degree or withdrawal

Federal Direct Subsidized and Unsubsidized William D. Ford Student Loans (Direct Loans) are available through the Financial Aid Office. Subsidized loans are based on financial need and interest accrued while the student is in school is paid by the federal government. Unsubsidized loans are available to students regardless of income and assets, and there is no interest subsidy.

- Undergraduates may borrow up to annual maximums of $3,500 subsidized plus $2,000 unsubsidized = $3,500 for freshmen, $4,500 subsidized plus $2,000 unsubsidized = $6,500 for sophomore, and $5,500 subsidized plus $2,000 unsubsidized = $7,500 for juniors and seniors, up to a maximum aggregate indebtedness of $23,000 for subsidized loan and $31,000 in combined subsidized and unsubsidized loan
- Independent undergraduates may borrow unsubsidized Direct Loans up to annual maximums of $9,500 for freshmen, $10,500 sophomores, and $12,500 for juniors and seniors, up to a maximum aggregate amount of $57,000, of which $23,000 can consist of subsidized loans
- Graduate and professional students may borrow subsidized Direct Loans up to an annual maximum of $8,500. Health professions students may borrow higher amounts dependent on the length of their academic year
- Graduate and professional students may borrow unsubsidized Direct Loans up to an annual maximum of $12,000
- For the most current interest rates on Direct Loans, see *http://www.dl.ed.gov*
- A 1.5% loan fee is charged on all Direct Loans. The fee is deducted proportionately from each disbursement
- For Direct Loans, repayment begins six months after graduation or withdrawal from school

Federal Direct Parent Loans for Students (Direct PLUS) are government-insured loans that are made to parents of dependent students.

- Parents may borrow Direct PLUS up to the cost of education minus other financial aid received during the years the dependent student is an undergraduate
- There is no interest subsidy for this loan
- A 4% loan fee is charged and deducted proportionately from each disbursement
- Repayment begins within 60 days after loan disbursement

Direct Grad Plus Loans. The Grad Plus Loan is provided by the William D. Ford Direct Loan Program. (Students in Teaching Credential programs are not eligible for Graduate Plus loans.)

- For the most current interest rates on Direct Loans, see *http://www.dl.ed.gov*
- Credit checks are required to be eligible for the Grad Plus. Students who do not meet the credit requirements for a Grad Plus may still obtain the loan with an endorser who does meet the credit requirements
- A 2.5% origination fee is deducted from the loan amount
- Repayment period begins 60 days after loan disbursement.

Federal Perkins Loans are for U.S. citizens or permanent U.S. residents. Loans may be limited to a percentage of student's need because of demand and limited funds. This is a subsidized loan, which means the federal government pays the interest on the loan while the student is enrolled in school. Repayment starts nine months after graduation or withdrawal from school and may be extended over 10 years. Additional deferments are possible for temporary total disability or volunteer service in a private, nonprofit organization, VISTA or the Peace Corps. Some teachers of students from low-income families and full-time teachers of handicapped children may also qualify for partial loan cancellation.

Annual Federal Perkins Loan Limits

- $4,000 for undergraduate students
- $6,000 for graduate/professional students

Aggregate (Maximum) Loan Limits

- $8,000 for a student who has not completed the first two years of undergraduate work and for programs that are less than two years in length
- $20,000 for a student who has successfully completed two years of a program of education leading to a bachelor's degree but who has not completed degree work
- $40,000 for a graduate/professional student (includes loans borrowed at the undergraduate level)

Short-Term Loans meet temporary or emergency financial needs of registered students. Loan funds are provided by UC Davis alumni, ASUCD, the Cal Aggie Foundation, the Regents of the University of California and private donors.

- **Emergency Loans:** $500 maximum. The maximum repayment period is 30 days.
- **Short-Term Loans:** $500 maximum; exceptions to the maximum amount can be made if financial aid funds are expected. The maximum repayment period is five months or the end of the academic year.
- **Assistant Loans:** graduate students who are in the teaching assistant, research assistant, readership, associate-instructor or postgraduate researcher classifications can apply for a maximum of one month's salary. The maximum repayment period is six months or the end of the academic year, whichever occurs first.

For applications and more information about applying, see *http://financialaid.ucdavis.edu*.

Federal Work-Study

Student Employment Services
1100 Dutton Hall
(530) 752-0520; *sec@ucdavis.edu*; *http://jobs.ucdavis.edu*

Undergraduate Work-Study

The Federal Work-Study program allows students to earn part of their financial aid through part-time employment. To participate, students must file a Free Application for Federal Student Aid (FAFSA) and receive Work-Study as a part of their financial aid package. Work-Study awards offer both money for education and work experience. Work-Study recipients should obtain a Work-Study job or ask to defer the Work-Study before December 1 or the award will be canceled. The Student Employment Center coordinates the Federal Work-Study program for undergraduates at UC Davis.

Community Service. A wide variety of community service jobs are available for students who apply for Work-Study funding. These jobs provide educational and rewarding work experience and help students connect with the community at large. Students applying for community service jobs also receive priority consideration for Work-Study funding.

Work-Study for Graduate Students

Work-Study funds for graduate students are allocated directly to the chairpersons of the graduate programs. Graduate students seeking Work-Study funding should contact their respective departments for further information. Students must file a FAFSA and have financial need to be considered for Work-Study funding.

Undergraduate Scholarships and Awards

Undergraduate Scholarship Office:
Dutton Hall
(530) 752-2804; *scholarships@ucdavis.edu*;
http://scholarships.ucdavis.edu/scholarships/

Mailing address:
Undergraduate Scholarship Office
University of California
One Shields Avenue
Davis, CA 95616-8696

UC Davis recognizes outstanding students with scholarships awarded on the basis of academic excellence and exceptional promise. The Scholarship Office administers approximately 220 different undergraduate scholarships. Many more scholarships are handled through outside agencies.

Committees made up of faculty and staff determine scholarship eligibility. In addition to academic records (a minimum grade point average of 3.250 is required), selection may be based on letters of recommendation, test scores and a personal essay in which your university goals and objectives are stated. Some awards are limited to students in specific majors or colleges, residents of certain geographical areas, students of a particular class standing, or students with demonstrated financial need. Most scholarships are not renewable and you must reapply each year for scholarship aid.

Students applying to the university are considered for scholarships using the same forms completed for admission purposes. The undergraduate scholarship application for continuing students becomes available online in October and is due in early January. See the Scholarship Office website for instructions and the application. Scholarship recipients will be notified beginning in April.

Graduate students are also eligible for various scholarships and fellowships; see the Graduate Studies chapter.

Regents Scholarships, among the highest honors that undergraduates at the university can receive, are granted to exceptionally promising freshmen or juniors enrolling in the fall quarter. Awards may be honorary (honorarium) or may be accompanied by a stipend (for students demonstrating financial need), which generally covers the difference between family resources and yearly educational costs. These scholarships are renewable as long as students maintain a 3.250 cumulative grade point average.

- Dollar amounts vary, but the stipend may cover up to the full cost of attendance for California residents
- 2-year and 4-year renewable scholarships

Alumni Scholarships provided by the Alumni Association in cooperation with the university, are based primarily upon leadership and scholastic achievement. Your financial need and extracurricular activities may also be considered.

- $1,000 minimum
- New undergraduates only
- Selection by local alumni association chapters

Military Scholarships are awarded to outstanding high school seniors without regard to financial need, as well as to UC Davis students who have demonstrated exceptional leadership and scholastic achievement during their freshman and/or sophomore years. Eligible high school seniors apply for the full 4-year scholarship and must file applications by November. UC Davis scholarship students participate in the Military Science (ROTC) Program. Information and applications are available from the Department of Military Science in 125 Hickey Gymnasium (530) 752-5211.

- Full fees, books and supplies
- $1,000 per year for miscellaneous expenses
- 1-, 2-, 3- or 4-year scholarships

Other Scholarships are made possible by individual donors, private corporations and various agencies. Many organizations and groups conduct their own scholarship programs. In most cases, you apply directly to these sponsoring groups. Free scholarship search services are available through our website.

- Generally $300 to $4,500

Special Prizes at UC Davis recognize outstanding performance, achievement and promise in special programs or majors. The most prestigious prize is the University Medal, presented to the most outstanding graduating senior.

- Plaques or certificates and cash awards
- College and school medals to outstanding graduates

STUDENT LIFE

LIVING AT DAVIS

ON-CAMPUS HOUSING

Residence Halls

Student Housing Office
(530) 752-2033; *studenthousing@ucdavis.edu*

Living on campus adds a measure of convenience to your life and helps familiarize you with the campus. Some 4,500 undergraduate students live on campus each year, including about 90 percent of freshman students. In each of the residence hall complexes, students and staff help create and maintain an environment conducive to personal growth and educational achievement.

Rooms are furnished with a bed and mattress, desk and chair, bookcase, chest of drawers, study lamp and wastebasket for each resident. Cost depends on room occupancy (single, double or triple) and which of the twelve meal plans you choose. Rates for the next academic year have not yet been formally approved.

All new freshmen whose Statements of Intent to Register (SIR) are received on time are guaranteed residence hall housing as long as they complete all of the instructions that accompany their contracts and return the materials and reservation fee by the due date. Freshmen housing contract offers will be mailed out by May 16. Transfer students that have submitted their Statement of Intent to Register will be offered a housing contract in the residence halls and single student apartment spaces. Transfer students under 24 years of age may live in the residence halls or single student apartment spaces. Transfer students 24-30 years of age will be offered a single student apartment space in one of three apartment complexes in Davis. Students over 30 years of age will be given information about apartment complexes in the city of Davis that have available space for transfer students. Student Housing information is included with your admissions packet. If you have a special need, such as a medical condition, disability, dietary requirement, or circumstance that requires special accommodation, or consideration, please send a detailed letter of explanation to Student Housing, 160 Student Housing, One Shields Avenue, University of California, Davis, CA 95616-8712, once you have submitted your housing contract.

Student Housing

Orchard Park/Solano Park Apartments
(530) 752-2033

Orchard Park and Solano Park Apartments offer 476 university-operated, unfurnished, on-campus apartments located in serene park surroundings for UC Davis students with children.

- Orchard Park; two-bedroom unfurnished apartments
- Solano Park; one-and two-bedroom unfurnished apartments

New rates subject to approval by the UC Regents will be available in mid-May. The new rates will be listed at *http://housing.ucdavis.edu/prospective/fees_parks.asp*. Once approved, they will be effective starting August 1. While our first priority is to house students with children, Student Housing supports the University's commitment to provide on-campus housing to graduate students. Our waiting list is prioritized as follows: students with children; married or domestic partnership students, graduate students; undergraduate students. Vacancies in Orchard Park/Solano Park Apartments are filled from a waiting list based on the date the application is received. For a fall assignment, you should apply at least six to nine months in advance. For an assignment during the remainder of the year, the waiting period is usually shorter. You may submit an application before you are admitted to the university. If a member of your family has a physical disability that requires special housing accommodation, please attach a detailed letter of explanation to your application.

Russell Park

(530) 753-7322

Privately owned and managed on-campus living accommodations are available for student families. Russell Park features one-, two- and three-bedroom unfurnished units.

Primero Grove

(530) 754-8455
primero@ucdavis.edu

Privately owned and operated, Primero Grove offers affordable on-campus housing for continuing undergraduate, graduate and professional students. Apartment sizes range from studios through four bedrooms.

Graduate Student Apartment Housing

The Atriums
(530) 753-0659

The Atriums offers on-campus living accommodations for single graduate students. The ***privately owned and managed*** apartments feature studio and two-bedroom unfurnished units.

OFF-CAMPUS HOUSING

The majority of UC Davis students live off campus. The City of Davis has ample apartments for rent, from one-person studio apartments to five- or six-person suites. Townhouses, duplexes and houses throughout the city are also available for student rental. ASUCD maintains a list of available community housing.

TRANSPORTATION AND PARKING

Transportation and Parking Services (TAPS)
Located on North Dairy Road
Office hours: M-F, 7:30 a.m.-4 p.m.; Enforcement hours: 7a.m-10 p.m.
(530) 752-8277; *http://www.taps.ucdavis.edu*
Motorist Assistance Program: (530) 752-8277
Bicycle Program: (530) 752-BIKE (2453)

The central campus is closed to motorized vehicles. Walking and bicycling are the most common ways to traverse the campus.

Bicycles. All bicycles ridden or parked on campus must have a current California state bicycle license. You may buy a license or renewal tag at TAPS. Bicycle traffic and parking regulations are strictly enforced. Bikes may be parked only in designated parking areas and may only be secured to bike racks and pods. The Bicycle Program rents bicycle lockers on a quarterly or annual basis for storage of bicycles only. The ASUCD Bike Barn, at the Silo, offers repairs and rentals, and sells used bikes, bicycle parts and accessories. Students can also check out tools to do their own repairs or maintenance at the ASUCD Bike Garage in the North Entry Parking Structure.

Parking. If you park a vehicle (including a motorcycle or moped) on campus, you must display a valid UC Davis parking permit or pay for time at a meter. Parking is permitted in marked spaces only, with permits displayed so all information is visible through the front window. You may purchase a daily visitor permit at permit dispensers in any visitor parking lot or at TAPS. Visitor permits are valid in visitor lots and in “C” areas. After 5 p.m., they are

also honored in "A" permit areas and at meters. All other lots require long-term permits, which may be purchased at TAPS.

Motorist Assistance Services. TAPS provides complimentary on-campus motorist assistance services including vehicle lock-outs, battery jumps, gasoline retrieval and tire inflation services.

Ridesharing. UC Davis encourages ridesharing. Registered carpools and vanpools receive reduced parking rates and preferential parking. For information on transportation alternatives, public transit, or commuter match assistance, call (530) 752-MILE (6453).

Shuttles. The UC Davis/UC Davis Medical Center Shuttle provides hourly service Monday through Friday between the UC Davis campus and the medical center in Sacramento. The shuttle is available to all members of the UC Davis community. You may purchase shuttle passes at Parking Services or the Cashier's Office. Departmental business passes are available at Parking Services.

The Intracampus Bus provides transportation between the UC Davis campus and the UC Berkeley campus for university employees, registered students and other university affiliates. Call Fleet Services at (530) 752-8287 for schedule information and reservations.

Buses

Unitrans
5 South Hall
(530) 752-BUSS; *http://www.unitrans.com*

Unitrans, operated entirely by undergraduate students, provides year round public transit service on 15 lines on the UC Davis campus and the City of Davis. Unlimited access is provided to undergraduate students with a valid UC Davis registration card; others may ride by paying the single-ride cash fare or by purchasing discounted multi-ride passes from TAPS or at the Campus Box Office. Full service is provided each UC Davis school day (Monday-Friday; 7:00 a.m.-7:30 p.m.) and at nights (Monday-Thursday; 7:30 p.m.-11:30 p.m.) during the regular school year. Reduced schedule service operates during the summer, finals week, all academic break periods and on Saturdays. Unitrans operates the J, O, P, Q and W lines on Saturdays, as well as both a shuttle from Amtrak and demand response Uni-Ride services on Sundays and designated holidays. Schedules are available at the MU Campus Information Center, bus terminals, Davis City Hall, the Unitrans office and at *http://www.unitrans.edu*.

STUDENT EMPLOYMENT

Student Employment Center
First Floor, Dutton Hall
(530) 752-0520; *sec@ucdavis.edu; http://jobs.ucdavis.edu*

Many employment opportunities are available at UC Davis and with private employers. Full-time or part-time students, students on PELP and students with a letter of acceptance for the following quarter who have not yet registered are eligible. With a part-time job students are able to borrow less loan and still meet their Self-Help Contributions. Most students work 10-12 hours a week while attending school, many in jobs on campus. There a wide variety of community service jobs, which can be both educational and personally rewarding.

Computers are available in 1210 Dutton Hall to assist with the job search at *http://jobs.ucdavis.edu*. Students are welcome to call, e-mail, or stop by Student Employment for job search assistance.

CHILD CARE AND WORKLIFE

Heitman Staff Learning Center
(530) 752-5415; *http://www.hr.ucdavis.edu/worklife-wellness*

WorkLife is the principal resource on campus for referrals, outreach, education and programming that enable students, faculty and staff to meet commitments and pursue interests both in and outside of the university. Services address child care, elder care, breastfeeding support, health and wellness, and workplace flexibility. The unit serves as the university's liaison with the on-campus child development centers and City of Davis Child Care Services.

On-Campus Child Care Programs and Resources

- **Hutchison Child Development Center** (530) 752-3345; *hutchison@brighthorizons.com*; *rhttp://www.hr.ucdavis.edu/worklife-wellness/Life/childcare/hutchison-child-development-center*
- **LaRue Park Child Development Center** (530) 753-8716; *laruecdc@ucdavis.edu*; *http://www.davischildcare.org/*
  Russell Park Child Development Center (530) 753-2487; *russellcdc@ucdavis.edu*; *http://www.davischildcare.org/*
  Privately owned and operated with university oversight, serving infants through preschoolers.
- **Early Childhood Lab School at The Center for Child and Family Studies (**530) 752-2888; *http://ccfs.ucdavis.edu/EarlyChildhoodLaboratory.html*
  A teaching and research laboratory for the Department of Human and Community Development, offers part-time programs for infants through preschoolers. Children are selected from a waiting list according to criteria designed to meet academic goals.
- **The UC Davis Breastfeeding Support Program (**530) 752-5415; *http://www.hr.ucdavis.edu/worklife-wellness/Life/breastfeeding-support-program-1*
  Provides lactation sites with electric breast pumps, registration and orientation sessions, private consultation, and sales of supplies for mothers who wish to continue breastfeeding their infants after returning to school or work.
- **The Student Employment Center (**530) 752-0520; *http://jobs.ucdavis.edu*
  Posts listings for parents seeking license-exempt providers.

Community Child Care Programs

City of Davis Child Care Services
600 A Street
Davis, CA 95616
(530) 757-5695; *http://www.city.davis.ca.us/cs/childcare/*

City of Davis Child Care Services maintains information on licensed family child care homes, day care centers, nursery schools, playgroups, support groups and other family-related services for all of Yolo County. Additional services include parenting workshops and handouts; a bi-monthly newsletter; a parenting resource library; and a book, video and toy lending library. The program provides referrals to licensed family child care homes and administers the UC Davis Child Care Subsidy Program and the Child Care Grant, both of which can help low-income families pay for child care. Applications for subsidies are available at the grant office in 600 A Street.

COUNSELING AND HEALTH SERVICES

Counseling and Psychological Services (CAPS)

219 North Hall
(530) 752-0871; *http://www.caps.ucdavis.edu*

Counseling and Psychological Services (CAPS) offers confidential psychological and psychiatric services to all registered students experiencing problems or concerns that affect their academic progress and sense of well-being. Staff members provide short-term individual counseling and group counseling for academic, personal and interpersonal concerns. Students often seek counseling to examine issues such as relationships, family problems, stress, cultural differences, assertiveness, self-esteem, intimacy, depression and anxiety. Additionally, staff can assist with educational concerns such as coping with university life, academic performance, test anxiety and reentry adjustment. Services for relationship issues are also offered to students and their partners. Psychiatry services are available to students by referral. Staff can provide assistance with off-campus referrals.

Confidentiality is strictly maintained in accordance with state laws and ethical standards. To use CAPS' services, students should contact the receptionist for an appointment. If immediate assistance is needed, walk-in (urgent care) services are available Monday–Friday from 8:00 a.m.–4:45 p.m. After hours phone consultation is also available by calling our main number. In addition, Peer counseling services are also available Monday–Friday from 8:00 a.m.–5:00 p.m. through The House.

Students, faculty or staff who are concerned about a student or desire consultation or assistance in making a referral are encouraged to contact CAPS. Parents who are concerned about their UC Davis student's emotional reactions or behavior can also call CAPS to discuss their concerns.

Student Health Services

UC Davis Student Health & Wellness Center
(530) 752-2300; *http://healthcenter.ucdavis.edu*

Student Health Services (SHS) is conveniently located on campus at the UC Davis Student Health & Wellness Center. SHS supports students' academic goals by providing UC Davis students with wellness, illness and injury care at affordable rates. Services are available to all registered students regardless of insurance coverage. Student fees subsidize SHS services and students pay small fees for most services.

Advice Nurse, Acute Care and After Hours (530) 752-9649. Services are available for acute medical illness and injury care. Appointments are not required for Urgent Care, but students are encouraged to call the Advice Nurse before coming in. Patients are seen according to severity and urgency. In addition, our Advice Nurse service is free for all UC Davis students to discuss health concerns and the need for medical care. Some issues may be resolved through self-care or over the counter treatment.

Primary Care Clinics & Specialty Clinics (530) 752-2349. Student Health Services addresses the primary care needs of UC Davis students. Medical professionals are available by appointment five days a week for primary care treatment and referrals. Appointments can be made to fit around class and work schedules. To ensure continuity of care, students are assigned a primary care provider and are asked to schedule with this provider when requesting an appointment. For convenience, appointments may be scheduled on the same day that a student calls. Appointments can be scheduled for routine primary care, nutrition and fitness, men's/women's health and physical exams, allergy care, sports medicine, travel immunizations and other services.

Specialty Clinics (530) 752-2349. Physician specialists are available upon referral from a primary care provider. Services include acupuncture, dermatology, endocrinology, internal medicine, neurology, orthopedics, physical medicine & rehabilitation, and, podiatry. In collaboration with Counseling and Psychological Services (CAPS), behavioral medicine and psychiatry are also available upon referral.

Other Services. Laboratory, x-ray, pharmacy, over the counter products, physical therapy, massage therapy and dietitian services are also available through Student Health Services.

Health Insurance Requirement. The University of California requires that all students have health insurance. To help you meet this requirement, UC Davis automatically enrolls all registered students in the Student Health Insurance Plan (SHIP). Fees for SHIP coverage are charged to your student account each term along with your registration fees.

- If you want to be enrolled in SHIP, you are automatically enrolled—no action is required.
- If you have comparable insurance and do not want to be enrolled in SHIP, you must apply for a SHIP waiver by the published deadlines. If your waiver is approved, your SHIP enrollment will be waived through the end of the academic year. On campus medical care is available to all students at SHS, even if you waive SHIP.

More information can be found at *http://healthcenter.ucdavis.edu/insurance* or by visiting the SHS Insurance Services office at the Student Health & Wellness Center.

Health Education and Promotion

UC Davis Student Health and Wellness Center
(530) 752-9652; *http://healthcenter.ucdavis.edu/hep*

Health Education and Promotion (HEP) helps you enhance your wellness to meet your academic goals through student-centered education and creating health-promoting environments. HEP covers topics such as nutrition, physical activity, sexual health, contraception, alcohol, tobacco, other drugs, wellness, sleep, and stress management. Call or drop by to talk with HEP staff to get your questions answered. HEP also offers educational programs on various college health topics. All services are confidential and provided free of charge to registered students and organizations.

Anonymous HIV Counseling and Antibody Testing Program (530) 754-7000. HEP offers anonymous HIV counseling and antibody testing to registered UC Davis students. Free, oral, rapid testing is available weekly during the academic year.

Alcohol and Drug Abuse Prevention and Treatment (530) 752-6334. Alcohol and Drug Abuse Prevention and Treatment (ADAPT) provides assessments, education and referrals for students with identified needs related to alcohol or other drug (AOD) issues. ADAPT provides educational programs and one-on-one educational treatment. ADAPT offers Education Groups where students discuss AOD issues, alcohol poisoning, how to help a friend and decision-making skills. This group provides a confidential, safe and nonjudgmental environment. ADAPT also provides trainings on safe party management, how to be a good renter and how to help students with addiction issues. For more information on safer partying, see *http://safeparty.ucdavis.edu*.

East Quad Farmers Market (530) 752-9652. HEP co-sponsors a campus farmers market during fall and spring quarters. Fresh fruits, vegetables, nuts, and flowers are available on Wednesdays, from 10 a.m.–2:30 p.m. on the UC Davis East Quad.

Relaxation Room. HEP offers a relaxation space for students, which includes a massage chair, meditation cushions and a biofeedback program.

Wellness Portal. The portal assists students, staff and faculty in locating resources related to the various aspects of wellness. This "one stop shop" for wellness includes campus resources, as well those in Davis and the larger Web community; see *http://mywellness.ucdavis.edu*.

Outreach Presentations (530) 752-9652. Peer Health Educators and professional staff are available to facilitate small and large group presentations and workshops for residence halls, fraternities, sororities and other student organizations. Call for a complete list of programs offered or to schedule a program.

Student Positions. HEP offers paid and volunteer opportunities for students. The positions provide an excellent opportunity to develop skills in: conducting group presentations, changing health-related policies and influencing media. Transcript notation and/or academic credit are available. All positions require a three quarter commitment. Check our website in winter quarter regarding student opportunities.

The House

Temporary Building 16 (two-story house by Student Housing)
(530) 752-2790

The House is a professionally supervised peer counseling program of CAPS. Students receive confidential support, information and referrals regarding personal or social problems. Well-trained student volunteers assist fellow students through individual peer counseling and a wide variety of workshops held in an informal setting. Stress reduction and wellness resources include a meditation room, a video and listening room with relaxation and educational compact discs and an automatic massage chair. No appointment is necessary and services are offered on a drop-in or telephone basis Monday-Friday from 8:00 a.m.–5:00 p.m. during fall, winter and spring quarters.

Volunteers for peer counselor positions at the House are selected winter quarter. Students are trained in basic counseling skills and can receive units for training. Transcript notation is also available for quarters working as a peer counselor volunteer.

EXTRACURRICULAR ACTIVITIES

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

RECREATION

The Department of Campus Recreation

The Activities and Recreation Center (ARC)
232 ARC, One Shields Ave, Davis CA 95616
(530) 752-1730; *http://campusrecreation.ucdavis.edu*

The UC Davis Department of Campus Recreation provides many healthy activities and programs including social, physical, creative, intellectual and cultural activities to offset the stresses associated with a rigorous academic environment. These programs complement the academic mission of the university and enhance the quality of life for the campus.

The following facilities are managed through the Department of Campus Recreation:

The ARC

The Pavilion

The Equestrian Center

The Outdoor Center

The Craft Center

Hickey Pool

Recreation Pool

Recreation Pool Lodge

Intramural Fields

The following programs are offered through the Department of Campus Recreation:

Campus Recreation Memberships, Informal Recreation and Fitness & Wellness Programs

The ARC
(530) 752-1730

UC Davis students may enjoy the ARC at no charge. The ARC member services desk is where faculty, staff, alumni and others may purchase memberships, ask about informal recreational opportunities and sign up for healthy fitness and wellness programs offered through the Department of Campus Recreation. For more information on the above programs, please consult the website listed above.

Events & Conferencing

The ARC & The Pavilion

The Department of Campus Recreation staff manages all conference and event needs related to the meeting rooms and ballroom located in the Activities and Recreation Center. The Pavilion is a 150,000 square-foot reservable arena, as well as the home court for UC Davis NCAA Basketball & Volleyball. From concerts to career fairs, it's the ideal space to host any large event. For more information, please consult the Department of Campus Recreation website.

Intramural Sports and Sport Clubs

The ARC
(530) 752-1730

Campus Recreation's Competitive Sports program provides the students, faculty and staff of UC Davis the opportunity to participate in a variety of competitive and recreational sports on campus.

The Intramural Sports program offers numerous sports leagues, tournaments, and events throughout the year, including soccer, badminton, softball, flag football, ultimate, and volleyball. The

Sport Club program promotes student participation in a wide variety of athletic activities, provides opportunity for student competition at various levels of play and fosters the development of student leadership. Sport Clubs are comprised of student, faculty and staff of the University.

Cal Aggie Marching Band

The ARC
(530) 752-6469

The California Aggie Marching Band is a student-run volunteer organization dedicated to providing support for UC Davis and is committed to student development and camaraderie through excellence in musical entertainment and the embodiment of Aggie Pride. Known by many as the "Band Uh!," the band celebrates campus traditions and entertains participants and spectators at athletic, campus and community events.

Outdoor Adventures

The Barn; corner of California and Hutchison
(530) 752-1995

Outdoor Adventures will help you develop your outdoor skills and plan your outdoor excursion. You can rent professional quality equipment and arrange custom-designed trips. An up-to-date library contains topographic maps, trail guides and other materials. Outdoor Adventures offers classes, excursions and clinics for backpacking, rock-climbing, whitewater rafting, sea kayaking, mountaineering, cross-country skiing and more. Outdoor Adventurers also offers health care training classes in wilderness first aid, EMT, CPR, AED and swift water rescue.

Equestrian Programs

Garrod Drive; southwest of Veterinary Medical Teaching Hospital
(530) 752-2372

The 25-acre Equestrian Center is open year round, offering horse riding instruction in both English and Western riding. Group and private lessons are available for beginning through advanced levels, along with training in horse care and stable management. The Equestrian Center sponsors clinics, horse shows, summer youth equestrian camps and special events. The center is also home to the UC Davis Equestrian Club.

Craft Center

South Silo
(530) 752-1475/1730

The Craft Center is an ideal place to channel your creative energy, offering more than 90 affordable and fun classes each quarter. The center's 10 well-equipped studios are available for informal use on a day or quarter use basis. Workshops and classes are offered each quarter in woodworking, weaving, jewelry making, art and graphics, computer imaging, ceramics, photography, silk-screen printing, welding, leather working, stained glass and other crafts.

Aquatics

Recreation Pool

Corner of La Rue Road and Hutchison Drive
(530) 752-1730

Located near the ARC, the Recreation Pool's distinctive shape allows for a wide variety of water activities. The pool includes lap lanes, diving boards, an island, a large grass area for sunbathing and a shallow wading pool. Picnic tables and a barbecue are also available on a first come first served basis. The Rec Pool offers aqua aerobics classes and swim lessons for all ages. The pool opens for the season in mid-April and closes in mid-October.

Hickey Pool

Hickey Gymnasium Building courtyard; central campus
(530) 752-1730

Hickey Pool is a seven-lane, 33 and 1/3 yard pool with a moveable bulkhead previously used as the competitive pool on campus, housing six Intercollegiate Athletic teams, physical education classes, Intramural Sports, Sport Clubs, and University extension classes. The heated Hickey Pool is available to students and ARC members for lap swimming hours during the year.

CAMPUS UNIONS

Memorial Union Auxiliary Services
457 Memorial Union, One Shields Ave, Davis CA 95616
(530) 752-2524; *http://campusunions.ucdavis.edu*

Memorial Union Auxiliary Services manages the following Campus Unions programs and facilities to serve the campus by creating opportunities to build community, cultivate friendships and enhance learning.

Memorial Union (MU)

MU Campus Information Center
(530) 752-2222

The MU complex serves as the community center for the campus. The MU Campus Information Center's student staff can refer you to people, places, programs and services on and off campus. The complex houses ASUCD student government offices, Coffee House, Aggie Student Store, Corral, Campus Copies, Classical Notes, STA Travel, U.S. Post Office, UC Davis Bookstore, Campus Ticket Office, MUII meeting/conference facilities and U.S. Bank.

Griffin Lounge serves as a comfortable space for studying, getting together with friends and participating in special student organization programs such as Open Mic Night. Art Lounge and King Lounge on the second floor provide comfortable and relaxed space popular for studying and enjoying student art

Freeborn Hall, a 1,250-seat assembly hall in the MU complex, is used for performing arts, dances, banquets, lectures and conferences.

The Memorial Union also operates Putah Creek Lodge, located in the Arboretum and used for group gatherings such as workshops, banquets, lectures, barbecues and dances.

Silo Union

The Silo Union houses food services, meeting/conference facilities, lounges and the campus pub. Students will enjoy favorite programs like Trivia Night. Silo food services include both quick, popular and familiar fast food, such as Taco Bell, Carl's Jr. and Pizza Hut, as well as a large selection of fresh and healthy prepared items, Starbucks Coffee and a custom sandwich line. Located in the South Silo are the ASUCD Experimental College, Craft Center, Student Disability Center, Graduate Student Association, and a branch of the Bookstore serving the School of Law.

CENTER FOR STUDENT INVOLVEMENT

4th floor, Memorial Union
(530) 752-2027; *http://csi.ucdavis.edu*

Studies show that college students who are involved in campus life through activities and organizations feel more connected to campus, are more satisfied with their college experience and are more likely to graduate than non-involved students. The Center for Student Involvement (CSI) provides students with opportunities for campus involvement, leadership development, learning, exploration, community service, cross-cultural competence and collaboration by supporting a wide variety of student organizations and campus programs.

Student Organizations

Over 500 student organizations are registered and supported at UC Davis through Center for Student Involvement. They consist of cultural, political, religious, service, ethnic, academic, professional, international, social, recreational, performing arts, fraternity/sorority and advocacy groups that provide students and the entire campus with important educational experiences. More information about each registered student organization and how to start a club is available at *http://csi.ucdavis.edu*.

The Buzz

(530) 752-2027; *http://thebuzz.ucdavis.edu*

The campus kicks off the school year on the first Friday of Fall Quarter with The Buzz, a welcome festival filling the entire Quad. The Buzz welcomes new and returning students to campus with a night of live entertainment, games, prizes, free food and campus resources.

Activities Fair

(530) 752-2027; *http://spac.ucdavis.edu/af*

The Activities Fair held every October is an ideal opportunity to learn how to get involved, meet new people and try new activities, with 200 student organizations and campus programs providing information and recruiting members.

The Games Area

Games Area; located below the UC Davis Bookstore
(530) 752-2580 (530) 752-1730; *http://gamesarea.ucdavis.edu*

The Games Area features bowling lanes, billiards, video arcade, GameFlyTM video game rental kiosk, lounge space and storage lockers. Bowling leagues, classes, clinics and tournaments are provided for all ages from beginning through advanced skill levels. The facility is fully accessible to those with disabilities.

UC Davis Bookstore

(530) 752-6848; *http://bookstore.ucdavis.edu/*

The UC Davis Bookstore is a full-service institutional store owned and operated by the University that provides goods and services for the campus community to support the University's academic mission.

THE UC DAVIS ACTIVITIES AND RECREATION CENTER (ARC)

(530) 752-1730; *http://campusrecreation.ucdavis.edu*

The Activities and Recreation Center (ARC) hosts many recreational activities for the UC Davis community. The building itself has four indoor basketball courts (convertible to volleyball and badminton), eight four-wall courts, a multi-use activity center (MAC), an indoor track, large fitness/weight areas and an indoor climbing wall. In addition, the complex includes group exercise, dance and martial arts studios, student lounges with computer terminals and wireless access points, a large ballroom, a small conferencing center, a full-service Starbucks, and a Pro Shop. The building is separated into three distinct areas: the controlled area, the conference and event area and The Pavilion. All fitness related activities comprise the controlled area that is open to all students with a valid UC Davis identification card. Faculty, staff, alumni, retirees and others may purchase membership to the ARC for an annual or monthly fee. The conference area is accessible through the main entrance to ARC or through a smaller corridor on the Northeast side of the building that leads into the conferencing area.

The UC Davis Pavilion, formerly Recreation Hall, hosts athletic competitions, concerts, trade shows, conferences and miscellaneous spectator events each year. The Pavilion houses approximately 149,000 square feet of space and encompasses the home court of the UC Davis Aggies volleyball team, gymnastics team, and men's and women's basketball teams. The Pavilion hours and access vary depending upon the event being hosted. More information regarding the ARC can be found at the ARC website, calling the number listed or by stopping by the ARC member services desk located in the lobby area.

UC DAVIS INTRAMURAL SPORTS AND SPORT CLUBS

(530) 752-1730; *http://campusrecreation.ucdavis.edu*

The UC Davis Intramural Sports and Sport Clubs programs offer many different competitive sports activities ranging from the traditional team sports like football, basketball and soccer to individual or dual sports such as racquetball, table tennis and golf. Additionally, we offer some non-traditional activities like inner tube water polo, floor hockey and dodgeball. All UC Davis students are eligible to participate in intramural activities. Our Sport Clubs program offers many opportunities for intercollegiate. Each club is formed, developed, directed and controlled by its members within University guidelines. Stop by the office or see our website for a complete list of clubs.

INTERCOLLEGIATE ATHLETICS

264 Hickey Gymnasium
(530) 752-1111

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

Intercollegiate athletics attempts to strengthen the integration of its objectives with the academic and developmental objectives of the university while maintaining a program of academic and athletic excellence; where students are supported in their efforts to reach the highest level of performance by providing them with adequate to outstanding facilities, quality coaching, appropriate

support of health and wellness needs, and competitive opportunities with students from similar institutions.

Currently, the program consists of varsity teams in 14 women's and 9 men's sports. UC Davis is an active member of Division I. A majority of the varsity sports compete in the Big West Conference. Approximately 600 students compete on varsity teams each year.

ARTS

Whether you want to participate, be entertained or be inspired, an abundance of musical, theater, art, design and dance offerings take place on campus all year long.

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

Mondavi Center Administration Building
(530) 754-5000; *http://www.mondaviarts.org*

The Mondavi Center is the premier performance venue in Northern California and the regional destination for the best in classical music, dance, distinguished speakers, jazz, theater, and world music. UC Davis students receive 50% off every event ticket, while UC Davis Staff and Faculty enjoy 10% off their ticket purchases. Tickets are available through the Mondavi Center Ticket Office at (530) 754-2787 or at *http://www.mondaviarts.org*.

Music

Department of Music
(530) 752-5537; *http://music.ucdavis.edu*

The Department of Music sponsors the UC Davis Symphony Orchestra, the University Chorus, Early Music Ensemble, Concert Band and Wind Ensemble, Jazz Band, several world music ensembles, and chamber music groups. Music majors and other interested students can receive credit for participating in these groups, which perform at concerts and recitals open to the university community. The department sponsors artists-in-residence who give concerts, recitals and lectures. Free noon concerts featuring individual performers and ensembles—both professional musicians and music students—are a favorite weekly event during the school year. The Empyrean Ensemble is in residence on campus. The Department of Music sponsors nearly 100 public concerts each year.

Dramatic Art and Dance

Department of Theatre and Dance
222 Wright Hall (530) 752-0888;
http://theatredance.ucdavis.edu

The Department of Theatre and Dance has one of the finest theater facilities in California, with an unusually good stock of scenery, props, costumes, and state-of-the-art lighting and sound equipment. Facilities are complemented by an excellent faculty, the Granada Artists-in-Residence program (which brings a major director, choreographer or playwright to the department each quarter), Shakespeare's Globe, London, exchange program, and graduate students working on Master of Fine Arts degrees in acting, directing, choreography or design, and Ph.D. degrees in 20th Century Performance and Culture, all of whom contribute to the fine quality of UC Davis drama and dance productions.

Each year's schedule includes undergraduate festivals in theatre, dance and film; opportunities to work with professional directors and choreographers in three main stage productions; and performance projects and established scripts developed by M.F.A. students. These productions take place on our proscenium (Main), thrust (Wyatt), black box (Arena), performance studio (University Club) stages as well as in the Mondavi Center's Studio Theatre and Jackson Hall. These productions are part of the academic program of the department and serve an important purpose in the study of theatre and dance. Participation is open to all students.

Art Galleries

Memorial Union Art Gallery

Second floor of the MU (530) 752-2885

The Memorial Union Art Gallery features a changing series of contemporary and historical art exhibits throughout the academic year. Works by professional artists as well as students are on display for periods of approximately six weeks. The gallery sponsors print sales, special programs and lectures, and offers internships for those interested in career work in an art gallery or museum.

Design Museum

145 Walker Hall (530) 752-6150;
http://designmuseum.ucdavis.edu

The Museum features changing exhibitions of national and international design-related material, including architecture, clothing, graphic design, textiles, new media, and popular culture. Exhibitions reflect the curriculum of the Design Program and are dedicated to furthering our understanding of design, and the contributions design makes to shaping our experiences, environment and culture. The museum serves as a laboratory for experimental exhibition installation, interpretation and practice. The Design Collection is a supporting resource for the Design Museum.

Richard L. Nelson Gallery

First floor, Art Building (530) 752-8500

The Richard L. Nelson Gallery, named in honor of the first chair of the Department of Art, organizes regularly changing exhibitions of historical and contemporary works of art. The gallery's program reflects and complements the teaching program of the Department of Art and brings art to the university community and the Northern California area at large. The Nelson has a permanent collection of over 4,000 objects.

Fine Arts Collection

Art Building, adjacent to the Nelson Gallery (530) 752-8500

The Fine Arts Collection, representing various historical periods and cultures, is the UC Davis campus' major collection of art.

Basement Gallery

Art Building basement

The Basement Gallery is a student-directed gallery that exhibits the artwork of advanced UC Davis art majors. There are approximately three shows per quarter.

C.N. Gorman Museum

1316 Hart Hall (530) 752-6567; *http://gormanmuseum.ucdavis.edu*
Monday-Friday, 12-5 p.m.; Sun: 2-5pm, closed holidays and holiday weekends.

The C.N. Gorman Museum is committed to exhibiting contemporary artworks by leading Native American and Indigenous artists. Established in 1973, the museum is named after Carl Nelson Gorman, a Navajo artist, World War II code talker and one of the founders of the Department of Native American Studies.

STUDENT GOVERNMENT

Associated Students (ASUCD)

Student Government Administrative Office
348 Memorial Union (530) 752-3632

ASUCD Student Services Office
347 Memorial Union (530) 752-1990; *http://asucd.ucdavis.edu*

The Associated Students of the University of California, Davis (ASUCD), authorized by the regents and the chancellor, represents all undergraduate students and is responsible for over $10 million used to enhance the student experience. Graduate and law students also have access to all ASUCD commercial activities. Funds allocated to ASUCD provide activities and services that make life as a student a little easier, less expensive or just more fun.

ASUCD operates more than 40 activities, including the Unitrans bus system, The *California Aggie* newspaper, the Bike Barn repair services, travel service, free legal advice for undergraduate students, The Aggie Student Store, Campus Copies, Classical Notes, Project Compost, Cal Aggie Camp, Book Exchange, U.S. Post Office and the Coffee House, among others.

The ASUCD-sponsored Experimental College offers a variety of nontraditional classes each quarter for students interested in diversifying their educational experience. Radio KDVS stereo 90.3 FM, the student-run campus radio station, broadcasts at 5,000 watts. Other ASUCD activities include Entertainment Council and the Whole Earth Festival.

Picnic Day, a UC Davis tradition since 1909, is the largest student-run event in the nation. This annual spring open house features more than 100 exhibits and cultural displays, including a parade, a fashion show, sports, sheep dog trials, dachshund races, food, music and dancing.

You can find information about ASUCD programs at their website *http://asucd.ucdavis.edu*, in the Student Directory, which combines details about ASUCD services and organizations with the ASUCD student telephone directory or by visiting the ASUCD Student Services Office in the Memorial Union.

Allocated funds are budgeted through the ASUCD Senate. Based on a modified federal form of government, the senate consists of 12 elected senate members and the ASUCD president and vice president. The senate is the policy-making body for ASUCD and supervises all aspects of the association. The ASUCD president is the chief administrative officer and is assisted by the vice president. ASUCD is the liaison for the undergraduate student body and represents the students with other universities, the UC Office of the President and the regents.

The ASUCD Senate is the policy making body of the student government and are responsible for allocating funds through their annual budget hearings. The Senate consists of 12 members who serve year-long terms with elections held during the fall and winter quarters.

Seven commissions and one committee advise the senate and assist the governing board with its decisions by researching legislation and making recommendations. Commission chairs are ex-officio members of the senate. Each commission also involves itself with various projects that relate to its specific area.

- Academic Affairs advocates students' rights in the area of academics, including dealing with the Academic Senate and with issues such as grading policies, tenure and teacher evaluations. Academic Affairs also sponsors the popular "Last Lecture Series."
- Business and Finance makes recommendations to the Senate on all financial matters and conducts audits on ASUCD commercial units.
- Environmental Policy and Planning addresses all issues and concerns that pertain directly to the environment.
- Ethnic and Cultural Affairs makes recommendations on policies and programs concerning UC Davis' ethnic community, acts as a liaison between on-campus and off-campus bodies affecting ethnic students and their quality of life at the university.
- External Affairs deals with off-campus concerns including the regents, UC Office of the President, and the Davis City Council.
- Internal Affairs recommends policies to improve ASUCD operations and the quality of nonacademic student life on campus.
- The Gender and Sexuality Committee actively promotes awareness of gender and sexuality issues, and prevention of sexual assault through outreach efforts and education programs.
- The Elections Committee ensures the fair administration of ASUCD online elections. The committee coordinates candidate and ballot measure forums and provides unbiased election information.

The ASUCD President is the chief administrative officer and is assisted by the Vice President. ASUCD is the liaison for the undergraduate student body and represents the students with other universities, the community, the UC Office of the President and the regents.

The judicial branch consists of the ASUCD Student Court. The nine member court the responsibility to carry out all rules designated to it in the ASUCD Constitution and its bylaws. ASUCD Court Members serve "life" terms, lasting four years or their entire academic career at UC Davis.

UC Davis Administrative Advisory Committees

Office of the Chancellor; *http://chancellor.ucdavis.edu/aac/*

The Office of the Chancellor encourages students to participate in issues affecting the campus community by applying for membership on an administrative advisory committee. Each committee focuses on a specific area, such as athletics, childcare, disability issues, Regents' scholarships or student services and fees. The committees respond to requests for advice, identify needs or concerns within the charge of the committee and recommend action to the campus administration.

Applications are accepted each winter for service on committees the next academic year. Undergraduate students should contact ASUCD Student Advocacy. Graduate students should contact the Graduate Student Association.

Graduate Student Association (GSA)

Graduate Student Association (GSA)
Room 253, South Silo
(530) 752-6108; Fax (530) 752-5158; *gsa@ucdavis.edu*;
http://gsa.ucdavis.edu

The Graduate Student Association (GSA) is the officially recognized student government for UC Davis graduate students. GSA provides a forum for addressing the concerns of graduate students and promotes communication with campus administrators. GSA also serves as an advocate at all levels of the university on behalf of graduate students. Funded by graduate student fees, GSA provides services to all academic graduate students and to professional students in the Graduate School of Management. Services include new student orientation, legal service, travel awards, announcements and assorted social events. Other professional students are eligible to join GSA by paying a fee.

GSA General Assembly representatives are usually designated by other students in their department or graduate group but can be selected through other processes determined by their department or graduate group. General Assembly meetings are held once a month and are open to all graduate and professional students. Each year the General Assembly elects the members of the Executive Council, who serve in a variety of positions to carry out the policies and functions of the organization.

Student Organizations

Greek Life

(530) 752-4606; *http://greeklife.ucdavis.edu/*

Affiliation with fraternities and sororities provides a connection to campus through friendships, a support group for academic and personal growth, leadership opportunities and involvement in campus activities and traditions.

The Student Recruitment and Retention Center

16 South Hall
(530) 754-6836; *http://thecenter.ucdavis.edu*

The Student Recruitment and Retention Center stands for educational equity. The center is a student-run student-initiated center serving historically underrepresented students. Programs include Southeast Asians Furthering Education (SAFE); (BRIDGE) Pilipino Outreach and Retention Program; Natives Empowered Through Unity & Education (NE' UE); African Diaspora Cultivating Education (ACE); Yik'al Kuyum—The Chicano/a and Latino/a Holistic Student Support Program; and Graduate Academic Achievement and Advocacy Program (GAAAP). The SRRC family is a group of diverse students who come to serve their communities, but also dedicate themselves to journeying together toward collective holistic empowerment. Some of the ways that we do this are: peer mentoring, study support, leadership retreats, K-20 enrichment, and available funding opportunities. Join our staff or volunteer and receive internship units or transcript notation

Cal Aggie Student Alumni Association (SAA)

Walter A. Buehler Alumni and Visitors Center
(530) 752-0286; *http://www.alumni.ucdavis.edu*

Student Alumni Association (SAA) follows the mission of "advancing student-alumni relations" by building community between past and present Aggies, providing student leadership opportunities, upholding Aggie traditions and offering benefits and services. Programs include Aggie Diner, Take an Aggie to Lunch, Take an Aggie to Work, Evening with an Aggie, Aggie Welcome events, Pajamarino and community service opportunities. You may join SAA at any time during the academic year. For information about joining SAA, *http://www.alumni.ucdavis.edu*.

ACADEMIC ADVISING AND STUDENT SERVICES

ACADEMIC ADVISING

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

COLLEGE ADVISING

College of Agricultural and Environmental Sciences

Office of the Dean
150 Mrak Hall
(530) 752-0108; *http://www.caes.ucdavis.edu*

In the dean's office you will find:

- Staff advisers who can help with university and college rules, regulations and policies and procedures that affect students
- Academic advising; in-depth advice regarding probation/dismissal status, admission to the college, readmission, second baccalaureate options, and limited status enrollment requirements
- Advice and action on petitions
- Other services including college English requirement check, release of holds on registration packets and final evaluation for graduation

Associate Dean of Undergraduate Academic Programs

Diane Ullman, Associate Dean
150 Mrak Hall
(530) 752-0108

The college has an associate dean of undergraduate academic programs and advising staff who welcome the opportunity to become acquainted and to talk with individual students. They can also help you with academic problems if you are placed on probation or subject to dismissal.

Faculty Advisers/Staff Advisers. You will be assigned a faculty adviser to help you plan a program that corresponds to your individual educational interests. The master advisers coordinate advising within a major. Staff advisers in the department can advise you on courses, specific requirements of majors and career opportunities. You are strongly urged to consult with your faculty adviser or staff adviser each quarter before selecting your courses.

As educational objectives evolve, you may, in consultation with the master adviser for your major, choose a new faculty adviser whose area of expertise corresponds more directly to your specific objectives.

Undeclared/Exploratory Program (non-degree program)

150 Mrak Hall
(530) 752-0610

Are you unsure what major you really want to pursue? If so, you may want to register in the Undeclared/Exploratory Program. With the help of staff in the dean's office and the major advisers, you can explore specialized options, develop your decision-making abilities and select the major best suited to your needs. For registration purposes, indicate "Undeclared/Exploratory" on your admissions materials. You must declare a major before you complete 90 units; see Declaration of Major, on page 72, in the Academic Information chapter.

College of Biological Sciences

Dean's Office
202 Life Sciences
(530) 752-0410; *http://biosci.ucdavis.edu/*

The Associate Dean and staff in the Dean's office offer complete academic advising services for students working on a major administered by the College of Biological Sciences. We advise on college and university requirements, policies, and procedures, including PELP, withdrawal, readmission, change of major or college, multiple majors and late actions. We evaluate transfer work, discuss petitions for variance and provide degree checks for graduation purposes.

The office is also responsible for the academic progress of all students majoring in the college. If you have any problems (personal, medical, financial) that are affecting your academic performance, or if you are on academic probation, we invite you to make an appointment to see one of the advisers in the Dean's office.

Advising for the Major. Students who declare or intend to declare majors in Biochemistry and Molecular Biology; Cell Biology; Evolution, Ecology and Biodiversity; Exercise Biology; Genetics; Microbiology; Neurobiology, Physiology, and Behavior; or Plant Biology should contact the specific department office for academic advising services, where both faculty and staff advisers are available.

Students who declare or intend to declare a major in Biological Sciences or students who are in the Undeclared-Life Sciences program should consult with the staff in the Dean's office for program planning and major requirements.

Peer Advisers. Peer advisers are available in each department office. Biological Sciences houses its peer advisers in the Dean's Office.

College of Engineering

Undergraduate Advising Office
1050 Kemper Hall
(530) 752-1979; *http://engineering.ucdavis.edu*
Facebook: UC Davis College of Engineering

Information and assistance on academic, career and personal matters is available in the Undergraduate Advising Office, either through direct assistance from one of the staff advisers or through referral to other offices on campus. The Undergraduate Advising Office handles student petitions, transfer evaluation, articulation and degree certifications and advises students who are not in good academic standing.

Advising. Before registering for courses your first quarter, consult with your departmental staff adviser, whose name and office hours you can obtain at the department office. The departmental staff adviser is aware of the requirements for your major and will assist you with planning your program.

Mandatory Advising. The College has implemented a mandatory advising system that is enforced through SISWeb. You are required to meet with your adviser once a year, during a specific quarter, which is determined by the first letter of your last name (A-G = Fall; H-N = Winter; O-Z = Spring). Students are notified of the hold by checking SISWeb at the time of registration. If you fail to clear your hold during your specified period, you may be unable to make changes to your current registration and to register for

future quarters. If you meet with your adviser during this quarter and have your hold released, there should be no difficulties with subsequent registration. For more information on mandatory advising, call the Undergraduate Advising office at (530) 752-1979.

Students seeking information about graduate school preparation or undergraduate research opportunities in engineering can participate in the Gearing up for Grad School (Winter Quarter) and/or Gearing up for Undergraduate Research (Spring Quarter) seminar series offered by the College of Engineering. Additional advising about graduate school preparation and undergraduate research opportunities is available from the Undergraduate Advising Office in 1050 Kemper Hall (530) 752-1979 or *http://engineering.ucdavis.edu/pages/current_students/advising/policy.html#hold*.

Peer Advisers. A well-developed peer advising system complements faculty and staff advising. Peer advisers are available in 1050 Kemper Hall. They are also available during designated hours in the residence halls. To speak with a peer adviser, call the Undergraduate Advising Office at (530) 752-0553.

College of Letters and Science

Undergraduate Education and Advising Office
Education and Advising Office
200 Social Sciences and Humanities Building
(530) 752-0392; *http://www.ls.ucdavis.edu/Students*

The deans and staff in the Undergraduate Education and Advising Office can help you with issues relating to your academic goals and experiences. You can consult the Advising Office on matters such as program planning, selection of a major, exceptions to regulations and academic enrichment opportunities. To find answers to your questions and other useful information, including contact information and how to arrange to meet with an adviser, see *http://www.ls.ucdavis.edu/Students*.

The Undergraduate Education and Advising Office also provides a number of additional services:

- Determines how your transfer credits from other institutions apply towards completion of university, campus, and college requirements for the bachelor's degree. Applicability of transfer credit toward the major is determined by your major faculty adviser
- Performs degree checks to identify remaining university, campus, and college requirements, and certifies graduation
- Acts on petitions requiring the dean's approval
- Reviews the records of students who are subject to disqualification and determines whether such students may continue at UC Davis

Advisers. All new students who have selected a major will be assigned an adviser within that major department. New students should contact their department or program office during the first quarter of residence on the UC Davis campus to meet with their adviser. If your adviser is not available when you need assistance, or if you wish to consult an adviser in a major program other than the one represented by your assigned adviser, contact the department or program office for help.

New students are encouraged to see their faculty adviser at least once every quarter during their first year on campus to discuss their educational goals, course program and progress.

Continuing students who have completed three quarters in residence in the college should consult with an adviser at certain important checkpoint stages in their academic careers. You are urged, however, to maintain regular contact with an adviser in your major to avoid program errors that may delay graduation. Seniors should maintain close contact with their advisers to ensure that they are meeting the major requirements.

Academic Options Program. Students who have not yet selected a major are automatically placed in the L&S Academic Options Program which provides academic advising to lower division students. Residence Hall Advising Team sites are located in on-campus residence hall areas. Each site is staffed by a team of L&S Peer Advisers who will be available to Academic Options Program students living in that residence hall complex. Through individual advising, group sessions, and programs, this team will work with you over the next several quarters. They will help you with your academic planning, ensuring progress toward your educational goals and satisfaction of degree requirements. They also can assist you in exploring your options before you select your major.

L&S Academic Options Program students not living in a university residence hall complex will receive academic advising from the L&S Undergraduate Education and Advising Office. Advisers there also are available to provide academic assistance to all students in the College of Letters and Science.

Advising Checkpoints. At a minimum, you should consult with your faculty adviser at two, possibly three, critical stages in your academic career:

- Before you complete 90 units of degree credit, including transfer work, you must develop in consultation with your faculty adviser, a proposal for a quarter-by-quarter program of courses showing how you will meet your educational goals and graduation requirements. You must also have declared a major by this time. Filing this plan with your adviser does not preclude subsequent modifications of the plan or a change of major.
- When you complete 135 units of degree credit, including transfer work, you may request a Degree Check from the Letters and Science Advising Office and should consult your faculty adviser concerning course selection and satisfaction of requirements in the major.
- Before you complete 195 units of degree credit, including transfer work, you must develop in consultation with your faculty adviser, a firm study plan in the form of a quarter-by-quarter program that will satisfy all remaining degree requirements as expeditiously as possible. This plan will be filed with your adviser. If the plan indicates that you will have to register beyond the 225-unit limit in order to meet degree requirements, you must contact the Undergraduate Education and Advising Office immediately. Exceptions to the 225-unit limit are granted by the dean only rarely. Typically, approval is granted only to allow completion of *minimum* degree requirements.

If you have not met with your faculty adviser before these established checkpoints, a hold may be placed on your registration as a reminder.

Peer Advisers. Student-to-student advising is an important part of the university advising services. The College of Letters and Science deans' office peer advisers are available in the Undergraduate Education and Advising office, in 200 Social Sciences and Humanities Building, and on a weekly basis in the campus residence halls to talk with students about their academic concerns.

ACADEMIC ADVISING SERVICES

Academic Peer Advising (530) 752-1736, places Peer Advisors in over 70 departments and Dean's offices to help students find the answers to their questions about major requirements, courses and university regulations. The Academic Peer Advisor complements faculty advising by providing a student perspective. The Academic Peer Advising program is managed by the Academic & First-Year Transition Services office in Student Housing, and the peer advisors are trained by the major departments to provide information and assistance about graduate schools, career opportunities and college requirements.

Student Academic Success Center

South Hall

1st floor, South Hall
(530) 752-3000; *http://advisingservices.ucdavis.edu*

Educational Opportunity Program (EOP) (530) 752-9711, offers an array of services to help students adapt both academically and socially to the University setting and successfully achieve their educational goals. EOP provides a caring and supportive environment for students to meet with peer and staff advisers and network with other students. Services include:

- Orientation and welcome activities
- Academic assistance
- Personal and social support
- Workshops
- Support network for former foster youth
- Tutoring and supplemental instruction
- Connection with campus resources and programs

Students interested in learning more about EOP may inquire at *eop@ucdavis.edu* or see *http://eop.ucdavis.edu*. The office is located in 106 South Hall; visitors are always welcome and no appointment is necessary.

The EOP Guardian Scholars Program (GSP) provides academic and personal support to former foster youth. The program offers services to help students transition to the University and increase their potential to succeed. The staff adviser serves as the liaison between students and various campus units, providing assistance with academic planning, financial aid, housing and other campus resources. The Guardian Scholars office is located in 102 South Hall.

Mentorships for Undergraduate Research in Agriculture, Letters and Science (MURALS) is a pre-graduate opportunity program designed to enrich the research experience of students who are "situational disadvantaged" in their access to graduate school. The mission of MURALS is to encourage students to further their education beyond the baccalaureate degree. By working with a faculty mentor, students not only have an opportunity to participate in academic research, but their experience may give them an incentive to pursue graduate work leading to a master's or doctoral degree. Students must be a junior or senior with a GPA of 3.000 and 90 units and meet additional eligibility requirements. For more information, please see the MURALS website at *http://murals.ucdavis.edu*.

Transfer Reentry Veterans Center (TRV) in 1210 Dutton Hall, *transferstudents@ucdavis.edu*, helps students who have transferred from other institutions of higher education and/or students who have returned to the university after several years of life and work experience. The center coordinates transfer student matters among existing student services units to aid in an easy and smooth transfer to the university. It also sponsors special receptions and workshops for new transfers as well as monthly workshops called Transfer Tuesdays. Feel free to drop-in to talk with a transfer student Peer Advisor or call to make an appointment.

Veterans Affairs (530) 752-2020, assists veterans, dependents and reservists with certifying course attendance to the Department of Veterans Affairs, coordinating a tutorial assistance program, providing advice and support, and helping with educational fee waivers, work study and financial aid concerns. To initiate a benefit claim, write or drop by with your letter of admission.

Student Regent, (530) 752-9204, The UC Davis Student Regent campus Coordinator assists students with the application process for this prestigious appointment. The Student Regent is a position on the Board of UC Regents, which governs the University and is responsible for the financial management of the University, its investments, and its property holdings. The Regents preside over the appointment of the President of the University, the ten campus Chancellors, and the Officers of The Regents, among others. The selected candidate is appointed to serve a two-year term; in the first year, s/he will serve as "Student Regent-designate" and will participate in all Board and committee meetings, but without voting privileges. In the second year, s/he will serve as Student Regent and will participate as a full voting member of the Board. To apply you must be an undergraduate, graduate, or professional student at one of the University's ten campuses and be in good academic standing. The Student Regent will be reimbursed for expenses incurred for attendance at Board and committee meetings, and all mandatory University fees and tuition will be waived during the student's two-year term.

Health Sciences Advising (530) 752-4475, offers individualized advice and information to students interested in admission to health profession schools (medical, dental, vet med, etc.) including prerequisite course planning, exam preparation, evaluation of competitiveness and assistance with all aspects of the application process such as writing the personal statement, getting good letters of recommendation, selecting schools/programs and strategies for becoming the most competitive applicant possible. In addition, Health Sciences Advising offers small group advising and informative workshops, and hosts visits from admissions officers from various health professions schools.

Pre-Graduate School Advising (530) 752-3000, assists students with the application process for Masters, Ph.D. or teaching credential programs. Staff members meet with students to discuss strategies on how to become a competitive applicant including GPA, test preparation, writing the statement of purpose, and obtaining strong letters of recommendation. Graduate School Information Day is held on campus each October to give students an opportunity to speak with representatives from Universities across the country in preparation for entrance to graduate school.

Pre-Law/MBA Advising (530) 752-4475, offers help with preparation and program planning for students interested in the legal profession or business fields. The staff and law student advisors also work with students on strategies on how to be a competitive applicant, test preparation, writing the personal statement and business

essays, obtaining letters of recommendation and selecting schools. In addition to providing the annual Law School Information Day each fall where students have an opportunity to speak with law school admissions representatives from over sixty law schools around the United States, the service also conducts several useful information programs each quarter.

Student Disability Center

160 South Silo
(530) 752-3184 (530) 752-6833 (TTY); *http://sdc.ucdavis.edu*

The Student Disability Center provides services to students with disabilities in accordance with Section 504 of the Rehabilitation Act, the Americans with Disabilities Act and state law. The SDC assists students with disabilities in identifying accommodations that will ensure they have equal access to educational opportunities at UC Davis. SDC staff also provide information to faculty and staff about working with students with disabilities.

Student Housing

160 Student Housing
(530) 752-1736; *http://housing.ucdavis.edu*

The First-Year Experience Program (530) 752-4546, is one component of the Student Housing Academic & First-Year Transition Services office, which includes the new student Orientation program and the academic year First-Year Experience Peer Advising program. All first-year and transfer students living in Student Housing and second year students have access to an extensive network of academic support services referred to as the "Residence Hall Advising Team," a partnership between Student Housing, the four Colleges and the Student Academic Success Center. Included are residential Academic Advising Centers, which offer drop-in peer advising provided by peer advisers from the four Colleges and the FYE Program. The peer advisers are able to assist with registration procedures, course selection, choosing a major or other general advising questions. The peer advisers can either answer your questions or put you in contact with others who can. Peer tutors from the SASC provide drop-in tutoring services during the evenings in the Academic Advising Centers for new students enrolling in common first-year courses such as Math, Chemistry, Writing and Statistics. Upper-division students should visit their major department adviser or College Dean's office for academic advising and support services.

New Student Orientation (530) 752-4443, *orientation@ucdavis.edu*, *http://orientation.ucdavis.edu*, assists new students and their families with the transition to UC Davis. Orientation includes assistance with academic advising, course registration, information for campus resources and social integration. The staff will introduce you to the campus environment, procedures and opportunities, and offers programs relevant to your changing needs. Your contribution to orientation programs, through ideas and assistance, is always welcome.

STUDENT CONDUCT AND GRIEVANCES

Student Judicial Affairs
3200 Dutton Hall
(530) 752-1128; *http://sja.ucdavis.edu*

Student Judicial Affairs (SJA) is charged with administering the student discipline system. SJA supports campus standards by resolving alleged violations of university policies or campus regulations. SJA also provides information about campus grievance processes and addresses student complaints involving prohibited discrimination or harassment (based on sex, race, religion, disability, etc.), arbitrary treatment, or unfair policies or practices. The office can help with conflict resolution and provide interpretations of university policies and regulations.

Misconduct and Discipline

Students enrolling or seeking enrollment in the university have an obligation to act honestly, ethically and responsibly consistent with the university's function as an educational institution. As members of our academic community and of society at large, students have both rights and responsibilities and are expected to comply with the general law, University policies and campus regulations. Rules concerning student conduct, student organizations, use of university facilities and related matters are set forth in both university policies and campus regulations; they apply to on-campus and University-related conduct or activities, and also to certain off-campus behavior.

Standards for student conduct are included in the *UC Davis Code of Academic Conduct*, the *Student Organization Sourcebook*, the Guide to Residence Hall Life and the *University of California Policies Applying to Campus Activities, Organizations and Students*. The operation of the campus student disciplinary system is outlined in the publication, the *Administration of Student Discipline*. These policies and regulations are available on the Internet. For assistance, contact SJA.

Misconduct for which students are subject to discipline includes, but is not limited to, plagiarism, cheating, or other dishonest or unfair academic misconduct; furnishing false information to the university; sexual assault, relationship violence, or other physical assault; threats of violence or conduct that threatens health and safety; misuse of university property or resources, including electronic communications; possession of weapons; harassment, including stalking and sexual harassment; forgery; theft; vandalism; possession, use, distribution or sale of drugs or alcohol that is illegal or against University policy; hazing; obstruction or disruption of university activities or functions; and alteration or misuse of university documents, records, keys or identification.

Disciplinary sanctions that may be imposed range from censure to dismissal from the university and may include restitution, exclusion from activities or areas of campus, and/or assigned community service. Suspected violations of campus or university standards by individual students should be reported to the Office of Student Judicial Affairs. Suspected misconduct by registered student organizations should be reported to Student Housing, Office of Student Development at (530) 752-1736.

If complaints cannot be resolved informally by agreement between Student Judicial Affairs, the accused student and the reporting party, the case may be referred to a hearing before a panel of students and faculty or staff, or a hearing officer. The president of the university, through the chancellor, has ultimate authority for the administration of student discipline.

Student Responsibilities

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

Discrimination/Harassment

If students believe that they have been discriminated against or harassed, they may contact Student Judicial Affairs at (530) 752-1128 or the Title IX and Americans with Disabilities Act Compliance Coordinator, (530) 752-9466, for information and assistance. It is important to seek assistance as soon as possible, as time limits may apply to some grievance processes. Advice is also available from the Sexual Harassment Information Line at (530) 752-2255 and the campus Sexual Harassment Officer at (530) 752-9255. Graduate students may contact Graduate Studies at (530) 752-0650 and/or the Graduate Student Association at (530) 752-6108.

RESOLVING ACADEMIC PROBLEMS

Grade Changes

Grades may not be changed once they have been submitted to the Office of the University Registrar unless (*1*) a clerical error has been made (e.g., homework score was added incorrectly) or (*2*) a procedural error has affected the student's grade (e.g., misapplication of grading procedures.). Students who believe they received an incorrect grade due to a clerical or procedural error should ask their instructor to file a grade change form with the Office of the University Registrar. If the instructor does not agree, the student should discuss the matter with the chair of the department. If at that point the matter is still unresolved, the student may request a change of grade by filing a grade change petition with the Office of the University Registrar. Requests must be made by the end of the following quarter.

The Academic Senate Committee on Grade Changes reviews requests for grade changes and, like the instructor, has no authority to reevaluate student work but can change the grade if it finds a documented clerical or procedural error. In the case of a challenged grade, the student will be expected to bear the burden of proving that a clerical or procedural error occurred and caused the incorrect grade to be assigned. If the alleged procedural error involves arbitrary treatment or prohibited discrimination, the Committee may inform the student of his/her right to file a complaint under campus grievance procedures (see nondiscrimination policy). For more information, students may contact the Office of Student Judicial Affairs (530) 752-1128.

See the *Class Schedule and Registration Guide (CSRG)* for further details. See guidelines for the Committee on Grade Changes at *http://academicsenate.edu/GCC*. Questions regarding this process should be directed to the Deputy to the Committee on Grade Changes at *GradeChanges@ucdavis.edu*.

Other Academic Problems

If you need a requirement waived or any other type of variance, contact your faculty adviser or the appropriate dean's office for information on your college's procedures. If you cannot get satisfaction through normal channels, contact the ASUCD Student Advocacy Grievance Center or the Committee on Student-Faculty Relationships; see ASUCD Student Advocacy Grievance Center, on this page.

ASUCD Student Advocacy Grievance Center

349 Memorial Union
(530) 754-4131/6101/3339

The ASUCD Student Advocacy Grievance Center advocates students' academic and nonacademic concerns to the faculty and administration. Grievance counselors assist students one-on-one, directing them to appropriate channels through which to state their academic grievances (e.g., student-faculty relations, sexual harassment, grade change problems, pre-judicial treatment in the classroom and problems with academic procedure and policy) and nonacademic grievances (e.g., campus facilities, campus safety, ASUCD and any other nonacademic concerns). All information discussed between counselors and students is completely confidential. Students can get counseling, referrals and support to aid in the resolution of these matters.

STUDENT ACADEMIC SUCCESS CENTER

EOP Services

Student Academic Success Center
2205 Dutton Hall
(530) 752-2013

The Student Academic Success Center (SASC) offers pre- and co-classes in mathematics and physics for EOP students. Pre-classes help prepare EOP students for the regular university class they usually take the following quarter. Co-classes provide supplementary instruction for EOP students enrolled in the regular class. The SASC offers pre-classes for Mathematics 16A, 21A and Physics 9A. The SASC also offers co-classes for the Mathematics 16 and 21 series and the Physics 9 series. All pre-classes carry three workload units and co-classes carry one workload unit. These units count toward minimum progress and financial aid eligibility, but do not count toward graduation.

Tutoring is a free service available to students. If you are having difficulty with your course work or just want to improve your grades, the Student Academic Success Center offers tutoring in many course areas. Tutoring is provided in pre-arranged groups and one-to-one and on a drop-in basis. The tutoring program is staffed by students carefully selected for both their knowledge of course content and their sensitivity to the needs of students being tutored.

Student Academic Success Center

2205 Dutton Hall
(530) 752-2013

At the Student Academic Success Center, you can receive help with general study skills, math and science concepts, writing essays and term papers, reading efficiency, English as a second language, time-management and test-taking skills and test anxiety reduction.

Learning specialists can help you individually, in small groups, or you may participate in workshops covering specific areas of study. Also available is a Resource Room with instructional materials, reference books, and open-access computers as well as sample exams for the Precalculus Qualifying Exam and the Entry Level Writing Requirement (WLD 57) and supplemental materials for workshops.

Undergraduate tutors offer group and individual sessions on a pre-arranged and drop-in basis. Come in and ask about our services, which are free to all UC Davis students.

Special Transitional Enrichment Program

Student Academic Success Center
2205 Dutton Hall
(530) 752-2013

Freshman EOP students are invited to participate in the Special Transitional Enrichment Program (STEP). The program begins in summer and continues through the first two academic years, offering preparatory course work, developing academic skills and providing advising. It helps students adjust academically and socially to the campus by strengthening their learning skills and study habits, and by providing an extensive orientation to campus life.

Student Housing Computer Centers

Student Housing
(530) 752-4274

Computer Centers are located in the Segundo, Tercero and Cuarto residence hall areas. They provide residents with a variety of academic resources in close proximity to their living areas. Technical resources include PCs with direct Internet connections, contemporary software titles, printers and scanners as well as areas for group study. The staff of the Residential Computer Support program are also available via telephone at (530) 752-4274, online Help Desk and for drop in support to answer questions and provide hardware and software support for residents.

INTERNSHIPS AND CAREER SERVICES

Internship Programs

The Internship and Career Center
2nd and 3rd Floors, South Hall, (530) 752-2855;
Buehler Alumni and Visitors Center (530) 752-2286;
http://icc.ucdavis.edu

You can take advantage of one of the hundreds of organized internships through the Internship and Career Center or initiate your own.

An internship may be full time or part time, credit or non-credit, voluntary or involving a stipend, depending on your needs and interests and the availability of openings. Internship experiences must emphasize learning rather than routine activities, must include field supervision by a qualified professional and, where appropriate, the faculty member responsible for giving credit. Academic credit is awarded only for experiences planned and approved in advance by the sponsoring faculty member.

The Internship and Career Center (ICC)

2nd and 3rd Floors, South Hall, (530) 752-2855;
Buehler Alumni and Visitors Center (530) 752-2286;
http://icc.ucdavis.edu

If you are an undergraduate, graduate or alumnus, ICC can help you identify your abilities and interests and relate them to jobs; gain access to practical experience to increase your competitiveness in the job market; and find out how and where to look for the jobs you want. ICC staff present workshops and seminars each quarter on finding an internship, beginning a job search, developing a resume and preparing for an interview. Webshops on these topics are also available at the ICC website.

The ICC Career Library (2nd floor, South Hall) contains materials that can help you learn how your major field of study can be translated into job opportunities and data concerning types of employment graduates have obtained. Useful to job-seekers-and available free of charge in print and at the ICC website is ICC's *Career Resource Manual*, which provides guidelines for preparing a resume, tips on being interviewed and information on employment in government, business and education.

The ICC coordinates Aggie Job Link, an online compilation of internship opportunities, part time student jobs and career vacancies that are augmented daily and accessible through the ICC website. ICC's Career Recruiting Programs, located in the Buehler Alumni and Visitors Center, arranges employment interviews and schedules on-campus recruiting by employers.

Graduate Student and Postdoctoral Career Services

The Internship and Career Center
3rd floor, South Hall
(530) 752-7841

Students enrolled in the teaching credential program or pursuing a master's or doctoral degree in order to teach should visit the Graduate Student and Postdoctoral Career Services offices in South Hall.

Services include teaching job vacancy listings, information on establishing placement files (professional dossiers) through Interfolio, and special workshops on writing teaching resumes, curriculum vitae and preparing for interviews. Individual advising is available by appointment.

Advisers maintain contact with school district personnel and provide resources to students and graduates on career opportunities. The office sponsors the Graduate Career Options Program for advanced degree candidates originally planning a teaching career and now considering other career options, and hosts the Pathways Symposium, a day-long career services event for graduate students and postdoctoral scholars.

Community Service Resource Center

The Internship and Career Center
2nd floor, South Hall
(530) 752-3813

If you are interested in providing community service please visit the UC Davis Community Service Resource Center coordinated through the ICC. Public service work can be a rewarding and satisfying experience that may also improve your qualifications for the job market. Community service may or may not be compensated through wages, academic credit or transcript notation and can vary from a one-day activity to a long-term commitment. The Community Service Resource Center is a referral program for students who want to perform community service and a resource for agencies and campus units with service opportunities. The office has a database and directories with information about non-profit agencies in California, community service opportunities throughout the world and employment in the non-profit or public sectors after graduation.

ACADEMIC RESOURCES

Education Abroad Center

207 Third Street, Suite 120
(530) 297-4633; Fax (530) 297-4695
http://eac.ucdavis.edu

The opportunity to study abroad is one of the richest educational experiences a student can have. When students return from study abroad in places like Italy or Hong Kong, they describe their time abroad as an experience that changed their lives. Students study abroad to see the world, to study their academic interests in a

global context, to learn a language, to prepare for a job in the global economy and to add distinction to an application for graduate or professional school.

The Education Abroad Center (EAC) can help students decide which program is best for them, whether to study abroad for a summer, quarter, semester or a full year and when to go abroad (freshman through senior years). The EAC Coordinators also participate in freshman seminars, offer financial aid workshops and can advise on programs that have internship opportunities. The EAC also administers the Global and International Studies (GIS) minor, which is sponsored by the Humanities Program in the College of Letters and Science.

The EAC is home to the University of California Education Abroad Program (EAP), to UC Davis Quarter Abroad and to UC Davis Summer Abroad. The EAC coordinates the Non-UC Study Abroad (NUCSA) leave program for students who are interested in participating on non-UC study abroad programs for transfer credit. Finally, the EAC advises and provides student services for international EAP Reciprocal Exchange students.

Freshman Seminar Program

1350 Surge III
(530) 752-6050; *http://trc.ucdavis.edu/*

The UC Davis Freshman Seminar Program gives first-year students the opportunity to study with faculty members in small groups, meeting in settings more informal than the ordinary classroom. The seminars focus on a current intellectual interest of the faculty member. All freshman seminars emphasize student participation, providing intense intellectual exchange among students and between student and teacher.

Mathematics and Science Teaching Program (MAST)

1023 Sciences Laboratory Building
(530) 754-9621; *mast@ucdavis.edu*, *http://mast.ucdavis.edu*

The UC Davis Mathematics and Science Teaching Program (MAST) program helps students explore mathematics and science teaching careers while working on their math, science, or engineering degree. Part of the statewide University of California Science and Mathematics Initiative, MAST offers seminars on education, internships in K-12 classrooms, and academic advising to help students choose coursework compatible with multiple goals, including preparing for a teaching credential program.

Student Farm

(530) 752-7645; *http://studentfarm.ucdavis.edu*

The Student Farm offers students a wide range of educational and research opportunities in sustainable agriculture through numerous internship offerings, formal courses (e.g., in organic crop production, sustainable agriculture and environmental education) and research efforts. Opportunities include several staff-supervised hands-on projects such as organic vegetable production and marketing, on-farm composting, tractor operations and environmental education tours for school children. In addition, students may conduct field and greenhouse experiments in various aspects of sustainable agriculture or other individual projects. The Student Farm is a part of the Agricultural Sustainability Institute and is located on the west edge of the campus core, near the Rec Pool. The Student Farm is open to all students, regardless of major or background.

STUDENT RESOURCE AND INFORMATION CENTERS

Campus Violence Prevention Program

Police / TAPS Building
200 Dairy Road Bikeway
(530) 752-3299

The goals of the UC Davis Campus Violence Prevention Program (CVPP) are to reduce the incidence of sexual assault, intimate partner violence, stalking and bias related incidents in the campus community and at the UC Davis Medical Center by increasing the knowledge and awareness of students, staff and faculty about such offenses; to provide crisis intervention, advocacy, support, counseling and referrals to victims of such offenses, their families and friends; to service as a resource for information regarding sexual assault, intimate partner violence, stalking and bias related crime; and to collaborate with other campus units and community agencies to provide a safer campus community and a concerted integrated effort.

The Program's **primary mission** is to eliminate all forms of violence and in the interim, to ensure that comprehensive and appropriate support services are available for survivors. The Violence Prevention Program provides **confidential and supportive responses to victims** and offers one on one advocacy with initial medical evaluation, legal and police procedures, and academic and housing issues. Confidential crisis intervention, problem-solving and advocacy is also available to recent survivors and to those working to recover from past incidents, as well as short-term intervention and support being available for friends, family, housemates and co-workers. With the overall purpose of providing for a comprehensive model program of support, education, training and outreach.

Center for Leadership Learning

168 LaRue Road; housed at The College at LaRue apartment complex
(530) 752-6908; *http://cll.ucdavis.edu/*

The Center for Leadership Learning (CLL) offers a variety of leadership programs for undergraduate students. CLL hosts the following programs: Student Leadership Development Series (SLDS), Student Employment Certification Program (SECP), Diversity Leadership Development Program (DLDP), and a campus-wide Leadership Conference. Each program aims to develop and cultivate a new generation of leaders who are civically and socially engaged, who demonstrate effective cultural and interpersonal communication skills, and who are prepared to successfully contribute to their professional field of choice. Leadership programs offered through the CLL are designed for any undergraduate student, regardless of their level of experience with leadership. By strengthening their leadership skills, students can increase their self-confidence, learn skills applicable to the world of work and enhance their resumes.

Cross-Cultural Center

Steven Baissa, Director
Corner of East Quad and Shields Avenue
(530) 752-4287; Fax (530) 752-5067;
ccc@ucdavis.edu; *http://ccc.ucdavis.edu*

The mission of the Cross-Cultural Center (CCC) is to foster a multi-cultural community through education and advocacy regarding systematic group oppressions, ethnic and cultural diversity, and establishing an environment of cross-cultural learning and exchange for the entire campus. The CCC advocates for a

campus environment free of racism, classism, sexism, heterosexism, ableism, body image oppression, religious/spiritual oppression and any other forms of oppression.

The CCC strives to build an inclusive and welcoming campus community through the annual Culture Days programs that raise awareness and celebrate our cultural diversity. Programs include Asian Pacific Culture Week, Black Family Week, La Raza Cultural Days and Native American Culture Days and Powwow. Everyone is invited to share in these programs featuring speakers, workshops, films, entertainment and family events.

The CCC is also home to Danzantes del Alma, a popular student folklórico dance troupe which celebrates the culture and heritage of Mexico through performances on campus and throughout northern California. All students are invited to participate and no prior dance experience is required.

Lesbian, Gay, Bisexual and Transgender Resource Center

Sheri Atkinson, Director
University House Annex
(530) 752-2452; *http://lgbtcenter.ucdavis.edu*

The LGBT Resource Center provides a comprehensive range of education, information and advocacy services and works to create and maintain an open, safe and inclusive environment for lesbian, gay, bisexual and transgender students, staff, faculty, their family and friends and the entire campus community. The LGBT Resource Center offers a library of over 1,100 books, most of which can be borrowed for two weeks for personal use. The Center can also serve as a meeting space for local organizations or support groups. Our focus is respect, pride and unity with regard to all individuals. The LGBT Resource Center is open Monday–Friday, 9 a.m.–5 p.m.

Services for International Students and Scholars (SISS)

Services for International Students and Scholars
(530) 752-0864; *siss@ucdavis.edu*

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

All new and transfer international students must attend a special orientation program held just before each quarter begins. The orientation helps new students with immigration regulations and finding campus services and community resources, and is a vital addition to campus and departmental orientation programs. Orientation for new J-1 international scholars is held each week. Students and scholars should report to SISS as soon as possible after arriving in Davis.

Estimated Costs for 2010-2011

International students are responsible for all of their expenses while studying at UC Davis. The expenses include nonresident tuition, educational fees, room and board and a modest amount for personal expenses. For the 2010-2011 calendar year (12 months), we estimate the cost will be $52,500 for undergraduates, and $50,000 for graduate students. Because the exact cost for tuition and fees is not determined until just before the beginning of the academic year, these are only preliminary figures. This minimum allowance may be increased without advance notice.

Women's Resources and Research Center (WRRC)

North Hall, First Floor
(530) 752-3372; *http://wrrc.ucdavis.edu*

The Women's Resources and Research Center (WRRC) educates the campus community about women's issues and concerns. We promote an understanding of the role and impact of gender in our lives and in our society, help women of diverse backgrounds achieve their intellectual, professional, and personal goals, and advocate for women's full inclusion, equality and advancement. The WRRC serves the needs of students, staff and faculty.

The WRRC's caring, knowledgeable staff answers questions, locates resources and helps you with a wide range of personal, academic or work-related concerns. The WRRC offers events, skill-building workshops and classes; a library focused on women and gender; advising, mentoring, advocacy and referral by WRRC staff; and informal, comfortable spaces to meet, study and socialize. Student internships and volunteer opportunities are available at the WRRC.

ACADEMIC INFORMATION

REGISTERING AT UC DAVIS

Registration

Office of the University Registrar
12 Mrak Hall
(530) 752-3639; *http://registrar.ucdavis.edu*

Registration is the way you become a student at the university. Every UC Davis student must register each quarter. Registration includes enrolling in classes, paying fees and other financial obligations, filing your current address with the Office of the University Registrar, and completing and filing other forms.

If you are a *new* or *reentering* student you must also:

- Have a student ID card produced; consult the appropriate quarter *Class Schedule and Registration Guide (CSRG)* for times and locations.
- Submit a Statement of Legal Residence; see the Appendix, on page 551.
- The California Health and Safety Code requires first time enrollees who are 18 years of age or younger to provide proof of immunization against the Hepatitis B virus prior to enrollment. For more information, see Student Health Services at *http://healthcenter.ucdavis.edu/newstudent/hep-b*.

New graduate students who have been registered previously at UC Davis as undergraduates are considered to be new students.

Change of Name. Be sure to inform the Office of the University Registrar of any change of address. You do this by updating your address using SISWeb; see *http://sisweb.ucdavis.edu*. Failure to provide your current addresses can result in a hold on your registration.

Change of Address. Be sure to inform the Office of the University Registrar of any change of address. Failure to file your current addresses can result in a hold on your registration. You can update your address using SISWeb; see *http://sisweb.ucdavis.edu*.

Late Registration

Late registration privileges extend through the 10th day of instruction, but you are assessed a late fee of $110.00 to defray the extra clerical costs. Registration after the deadline is allowed only if action or inaction on the part of the university delays registration. A recommendation from an appropriate administrative unit is required and the registration fee must be paid with cash, cashier's check, credit union check, university check or fee credit.

ENROLLING IN COURSES

SISWeb Registration. Students enroll in courses by using SISWeb on the Internet; see *http://sisweb.ucdavis.edu*.

The *Class Schedule and Registration Guide (CSRG)*, available one week before the start of registration for the quarter, explains registration procedures, gives class meeting times and locations, and provides updated information on fees and registration. The *CSRG* is available at the bookstore and at *http://registrar.ucdavis.edu*.

The Schedule of Classes, an open-courses list and other registration information, is available at *http://registrar.ucdavis.edu*.

Undergraduate Registration Priority. Access to registration is by priority groups. The groups are established according to student class level, as determined by the number of units completed. Undergraduate Class Level is determined as follows:

- Freshman Level 0–44.99 units
- Sophomore Level 45–89.99 units
- Junior Level 90–134.99 units
- Senior Level 135 units and above

You are officially registered in all courses listed on your individual study list. You are responsible for completing each of the courses. View your study list (class schedule) using SISWeb.

Adding and Dropping Courses

You can adjust your schedule by adding or dropping courses until the deadlines published in the *Class Schedule and Registration Guide (CSRG)*.

The last day to add courses is the 12th day of instruction. The last day to drop courses without dean's permission or fee is the 20th day of instruction, except for those courses designated by departments as 10-day-drop courses. You need to obtain the permission of your dean and pay a $3.00 fee to drop a designated 10-day-drop course after the 10th day of instruction or to drop any other courses after the 20th day of instruction.

The *Class Schedule and Registration Guide (CSRG)* for each quarter lists the add and drop deadlines and explains how to use SISWeb to adjust your schedule and what add/drop procedures and fees apply after the published deadlines. The academic calendar in the front of this catalog also lists the course add and drop deadlines.

Late Drop

To drop a course after the deadline (but before the day of the scheduled final examination), you need approval of the dean of your college or school. Graduate students must have their adviser's approval in order to drop courses. A $3.00 fee applies to late drops. Permission to drop courses after the deadline may be granted only in exceptional circumstances.

Late Add

To add a course after the deadline (but before the day of the scheduled final examination), you need approval of the department. A $3.00 fee applies to late adds.

Retroactive Drop

Occasionally, in exceptional circumstances, students are allowed to drop a course after the course is completed. Reasons for seeking a retroactive drop are very specific: medical problems, severe emotional difficulties, or recent death or severe illness in the immediate family. Petitions are subject to approval by the Grade Change Committee of the Davis Division Academic Senate. Petitions are available from the Office of the University Registrar and should include a detailed account of the problem, appropriate documentation and an adequate explanation of why an *I* grade or late drop was not taken during the quarter in which the problem occurred. The instructor's signature is required on the petition. A $3.00 fee is applicable on all retroactive drops.

Retroactive Add

In some rare circumstances, students are allowed to add a course after the course is completed. Petitions are subject to approval by the Grade Change Committee of the Davis Division Academic Senate.

Petitions for retroactive adds are available from the Office of the University Registrar. Each petition must include the reason for the student's failure to add the course during the quarter in which it was offered. The petition must be supported by the instructor's signed approval, together with a statement from the instructor indicating knowledge of the student's participation and performance during the presentation of the course in question and the instructor's understanding as to the reason for the student's failure to add the course before the end of the quarter. A course grade must be assigned by the instructor. A $3.00 fee is applicable on all retroactive adds.

COURSE LOAD

Expected Progress. Undergraduate students are expected to graduate in 12 quarters (four years). To do so, students should plan to complete an average of 15 units per quarter (15 units per quarter for 12 quarters totals 180 units). Because occasions arise which prevent students from achieving expected progress towards the degree, the campus has established minimum progress requirements, to which students must adhere.

Minimum Progress Requirements. To meet minimum progress, a full-time regular undergraduate is required to maintain an average of at least 13 units passed over all quarters of enrollment. Minimum progress is calculated at the end of every Spring Quarter for the preceding three quarters (Fall, Winter, Spring) comprising the academic year. Undergraduate students falling below this requirement are not in good academic standing and may be disqualified from further enrollment at the University. Quarters for which a student was officially approved for part-time status are omitted from the minimum progress calculation. For more information, see Probation and Dismissal, on page 80.

Certification of Full-Time Status. Undergraduate students must carry a study load of at least 12 units (including workload units) each quarter in order to be certified as full-time students for insurance and financial aid purposes or to compete in intercollegiate athletics. Graduate students must carry a study load of at least 12 units each quarter in order to be certified as full-time students.

Course Load Limits in the College of Letters and Science. Freshman students in their first year and transfer students in their first quarter of residence may not take more than 17 units each quarter. For all other Letters and Science students, the study list may not exceed 21 units each quarter. These unit limitations include non-credit remedial courses and repeated courses, but not make-up work to remove incomplete grades.

Course Loads in the College of Engineering. Because of the large number of required units in engineering programs, many students must take more than 15 units per quarter and/or attend summer session to finish in four years.

Part-Time Student Status

If, for reasons of occupation, family responsibility, health or, graduating-senior status (one term only), you are unable to attend the university on a full-time basis, you may qualify for enrollment in part-time status. Undergraduate students must file for part-time status each quarter. Graduate students with approved part-time status will remain part-time until the student enrolls full-time. To be considered eligible, undergraduate students must be registered in 10 units (including workload units) or fewer by the tenth day of instruction that quarter and graduate students must be registered in 6 units or fewer by the tenth day of instruction. Minimum progress requirements are waived for part-time students. Part-time petitions are available at the Office of the University Registrar and require approval by the University Registrar. Part-time students have use of the same facilities and are eligible for the same services, including Student Health Services, as full-time students.

THE MAJOR

You will find a complete list of the majors offered at UC Davis under Degrees Offered by UC Davis, on page 11.

Declaration of Major

College of Agricultural and Environmental Sciences. Students must declare a major by the time they have completed 90 units. Failure to declare a major at this point may result in a hold on further registration. In order to declare a major, you must meet with your faculty adviser and/or advising associate, fill out a Change of Major petition available at the Office of the University Registrar website or dean's office and file the petition with the dean's office. If you have completed 90 units, you must prepare a study plan with your adviser and/or advising associate at the same time. You are accepted into a major only after your major department and the dean's office have approved the Change of Major petition. With the approval of the College Executive Committee, additional requirements, such as completion of a particular set of required courses with a specified grade point average (usually well above a *C* average), may be introduced as conditions for acceptance into any major at any time.

College of Biological Sciences. Students must declare a major by the time they have completed 90 units. A hold will be placed on a your registration if you are still undeclared after completing 90 units. Students can obtain a Change of Major petition from the Dean's office or the Office of the University Registrar website. They must meet with an academic adviser for the major, discuss a projected plan of studies, obtain the adviser's signature and return the signed petition to the Dean's Office. The minimum requirement for entry into a major is a C average in all courses used to satisfy major requirements. Students are accepted into the major when their adviser and the dean have approved the petition.

Students who fail to maintain a 2.000 GPA in courses required for their major over two consecutive quarters may be required to withdraw from the major.

College of Engineering. Students must declare a major when they apply to the College of Engineering. The ability to change majors is subject to meeting the requirements set forth by the faculty of the College of Engineering. Requirements for changing to a College of Engineering major can be found at *http://engineering.ucdavis.edu/pages/current_students/advising/change_major.html#chg* or by contacting the Undergraduate Advising Office (530) 752-1979.

College of Letters and Science. Students must declare a major by the time they have completed 90 units. If you have not declared a major by this point, a hold may be placed on your registration. Such a hold would be removed only when your Change of Major petition is filed in the deans' office. Petitions can be obtained from department offices or the Office of the University Registrar's website. As a part of the declaration procedure, you must, in consultation with a faculty adviser, prepare a projected plan of study. You are accepted into the major when your adviser and the dean have approved the petition.

To be accepted into a major, you must have a *C* average in all courses you have completed that are required for that major, as well as a *C* average in the upper division courses you have taken toward the major. With the approval of the College Executive Committee, additional requirements, such as completion of a particular set of required courses with a specified grade point average (usually well above a *C* average), may be introduced as conditions for acceptance into any major at any time.

If your performance is unsatisfactory after you have declared a major program, you may be required by the dean to withdraw from that major, upon written recommendation from the chair of the department or the curriculum committee that administers the major.

Change of Major Within a College

To change from one major to another within a college, you need the consent of the department or committee in charge of your proposed new major and the approval of the dean. Admission into a major program may be denied by the program or by the dean if your grade point average (GPA) in courses required for the selected major is less than 2.000.

Procedures for change of major within a college are the same as for declaration of major and the same conditions apply. If you wish to change to a major that has admission restrictions, you must comply with the special procedures and requirements for that major.

Except under unusual circumstances, no change of major will be permitted after you attain senior standing (135 units). Students wishing to petition for such an exception should consult in advance with the relevant dean's office regarding additional restrictions and requirements.

It is not possible to change or declare a major in the quarter in which you file to graduate.

College of Biological Sciences. Students who wish to change their major after completing 135 units should include a quarter-by-quarter graduation plan with the change of major petition. Changes of major will not be permitted by the Dean after the beginning of the quarter of the student's graduation.

College of Engineering. The above provisions may not apply to students in the College of Engineering, whose freedom to change majors is limited. Requirements for changing to a College of Engineering major can be found at *http://engineering.ucdavis.edu/pages/current_students/advising/change_major.html#chg* or by contacting the Undergraduate Advising Office (530) 752-1979.

Change of Major Accompanied by Change of College

A change petition, available at dean's offices, the Office of the University Registrar, and online at the Office of the University Registrar's website, must be endorsed by a faculty adviser of the new major you are selecting and signed by a faculty adviser of the major you are leaving and the dean of the college from which you wish to transfer. In addition, admission to the new college will require that dean's approval. To obtain that approval, you must be in good academic standing (qualitatively and quantitatively, see the Probation and Dismissal, on page 80), meet all minimum GPA criteria, including those for the major, and satisfy any other admission requirements established by the new college.

Except under unusual circumstances, no change of major will be permitted after you attain senior standing (135 units). Students wishing to petition for such an exception should consult in advance with the relevant dean's office regarding additional restrictions and requirements.

It is not possible to change or declare a major in the quarter in which you file to graduate.

College of Biological Sciences. Students who wish to change their major and college after completing 135 units should include a quarter-by-quarter graduation plan with the change of major petition. Changes of major will not be permitted by the Dean after the beginning of the quarter of the student's graduation.

College of Engineering. Requirements for changing to a College of Engineering major can be found at *http://engineering.ucdavis.edu/pages/current_students/advising/change_major.html#chg* or by contacting the Undergraduate Advising Office (530) 752-1979.

Multiple Majors

College of Agricultural and Environmental Sciences. A student choosing to major in multiple majors must petition the departments/programs/divisions responsible for the major(s) and the dean of the college. The dean's approval of declaration for multiple majors is subject to the following:

1. Eighty percent of the upper division units offered in satisfaction of course and unit requirements of each major must be unique; that is, they may not be offered in satisfaction toward the upper division unit requirements of any of the other selected majors. Courses with substantial overlap in content will not count as part of the 80 percent. Departmental advisers may approve only one course for substitution when considering the 80 percent in upper division courses and units required for each major.
2. When unit requirements of the majors included in a request differ, the major with the smaller number of upper division units required should be used to compute the minimal unit difference that must be met.
3. A student in good academic standing and with a minimum of a *C* average in the upper division courses taken toward the major may elect to declare simultaneously more than one major within the college or a combination of majors offered by the college and other undergraduate colleges on campus.
4. Combinations of majors offered by a single department/program/division are not allowed. College of Biological Sciences. Admission into multiple majors is subject to the approval of offices in charge of the majors involved and the dean of the college. Departments, curriculum committees and other teaching units, singly or collectively, as well as faculty advisers have the right to disapprove a student's request for a multiple major.

College of Biological Sciences. Admission into multiple majors is subject to the approval of offices in charge of the majors involved and the dean of the college. Departments, curriculum committees and other teaching units, singly or collectively, as well as faculty advisers have the right to disapprove a student's request for a multiple major.

Approval of a request to declare more than one major is subject to the following:

1. Eighty percent of the upper division units used to satisfy requirements in each major must be unique; that is, they may not be offered in satisfaction of requirements of any of the other majors involved.

2. If the major programs differ in the number of upper division units required, the major program requiring the smaller number of upper division units will be used to compute the minimum number of units that must be unique.
3. In determining that the 80 percent requirements have been satisfied, advisers and the Dean must count both specific courses and courses with substantial overlap of content as common to the majors involved.
4. Students must complete all majors within the 225-unit limit.
5. Students may only petition for a multiple major after completing two Depth Subject Matter courses in each major.

A student who completes all requirements for approved multiple majors in which one major normally leads to an B.A. degree and another normally leads to a B.S. degree, will receive a B.A.S. degree. A single degree is granted to students who graduate with multiple majors.

College of Engineering. Engineering has two established combined majors. In addition to the combined majors, students may choose to complete two engineering majors. Enrollment in an engineering major and a non-engineering major may be possible. Double-major students must satisfy the requirements for both majors. Degree requirements for such double majors ordinarily cannot be completed within four academic years. A change of major petition is required for all requests and appropriate approvals from all applicable departments and dean's offices are necessary. Engineering has two established combined majors. In addition to the combined majors, students may choose to complete two engineering majors. Enrollment in an engineering major and a non-engineering major may be possible. Double-major students must satisfy the requirements for both majors. Degree requirements for such double majors ordinarily cannot be completed within four academic years. A change of major petition is required for all requests and appropriate approvals from all applicable departments and dean's offices are necessary.

The Department of Computer Science **does not allow** double majors of Computer Science and Engineering and Computer Engineering, **or** Computer Science and Engineering and Electrical Engineering, **or** Computer Science and Engineering and Computer Science.

Triple majors will not be approved.

If you want to double major in any over-subscribed engineering major, you will be subject to the additional restrictions for changing into those majors and must satisfy the requirements of both majors.

College of Letters and Science. Students choosing to major in multiple subjects must notify the dean's office of their decision by submitting for approval a petition endorsed by faculty advisers in the majors. The dean's approval of the declaration of more than one major is subject to the following conditions:

1. At least 80 percent of the upper division units used to satisfy course and unit requirements in each major selected must be unique and may not be counted toward the upper division unit requirements of any other major undertaken. Courses with substantial overlap in content will not count as part of the 80 percent.

   If the major programs differ in the number of upper division units required, the major program requiring the smaller number of units will be used to compute the minimum number of units that must be unique.
2. At the time of request, a substantial part of the preparatory subject matter and at least two upper division courses in each major must have been successfully completed.
3. All degree requirements *must* be completed within the 225-unit limit.

Combination proposals that *cannot be approved* are two or more majors offered by the same discipline, *except* art history and art studio.

A student who completes all requirements for approved multiple majors in which one major normally leads to an A.B. degree and another normally leads to a B.S. degree, will receive a B.A.S. degree. A single degree is granted to students who graduate with multiple majors.

Cross-College Majors

College of Agricultural and Environmental Sciences. The College does encourage multiple majors between colleges whenever your academic interests and abilities indicate this to be the best route. After endorsement of the Change of Major petition by the appropriate faculty in the colleges involved, each dean may approve the petition if there are sufficient differences between the requirements for the major programs you wish to study. At least 80 percent of the upper division units used to satisfy course and unit requirements in each major selected must be unique and not duplicate those of the other major. In planning for multiple majors, you should determine the total requirements needed for each major as well as for graduation from each college involved.

All degree requirements must be completed within the 225-unit limit.

The same conditions apply for cross-college majors as for multiple majors. Cross-college programs will not be approved if the majors involved are available within a single college as well. For example, cross-college programs between the colleges of Letters and Science and Agricultural and Environmental Sciences will not be approved if one of the majors is biochemistry and molecular biology; biological sciences; cell biology; evolution and ecology; genetics; microbiology; neurobiology, physiology, and behavior; or plant biology.

College of Biological Sciences. The same conditions apply for cross-college multiple majors as for multiple majors within the college. In addition, approval of the deans of all involved colleges are required for cross-college multiple majors.

College of Engineering. Enrollment in a combination of an engineering major and a non-engineering major may be possible. A change of major petition is required for all requests and appropriate approvals from all applicable departments and dean's offices are necessary. Such double-major students must satisfy the requirements for both majors. Degree requirements for such double majors ordinarily cannot be completed within four academic years.

College of Letters and Science. The same conditions apply for cross-college majors as for multiple majors. Cross-college programs will not be approved if the majors involved are available within a single college as well.

Triple majors will not be approved.

Individual Major

Students with academic interests not covered by an established major have the opportunity to develop an individual major. Such a major requires the selection of interrelated courses totaling a minimum of 45 upper division units from two or more areas of study. If you choose this option you will work closely with faculty advisers to develop a coherent and rigorous academic program. This program is then submitted to a faculty committee for review and approval. Submit the proposed program to the committee prior to reaching 90 units, or by the fourth full week of the fifth quarter before graduation, whichever is earlier. If you wish to undertake an individual major, request the appropriate forms from your dean's office. Program requirements are outlined under Individual Major, on page 342. *The College of Engineering does not offer an individual major. This program has been suspended in the College of Agricultural and Environmental Sciences*.

THE MINOR

If you are interested in two or more areas of study, you should consider completing one or more minor programs. Minor program requirements are listed in the chapter of this catalog under the department that offers them. You will find a complete list of the minors offered at UC Davis under Minor Programs Offered by UC Davis, on page 13.

A minor consists of 18 to 24 units in upper division courses specified by the department or program offering the minor. Courses used to satisfy the requirements of a minor, including those completed elsewhere, must be approved by an adviser in the sponsoring department or program. **For minors offered by the College of Agricultural and Environmental Sciences, at least half of these units and courses must be completed in residence on the UC Davis campus**. You are also expected to complete all courses that are prerequisite to the upper division courses required for the minor. Minors offered by the College of Letters and Science do not require that a portion of the units be completed at UC Davis.

Students in the College of Biological Sciences may not complete a minor in the same field as the student's major. This includes any minor offered by the department or curriculum committee in charge of the student's major. All major and minor requirements must be completed within the 225 total unit limit.

With the exception of interdisciplinary minors approved by the College Executive Committee, students in the College of Letters and Science may not complete a minor offered by the department or program in charge of the student's major.

To request certification of a minor, **you must have a grade point average of 2.000 in all courses required for the minor**. At most, one course used in satisfaction of your major may be applied to your minor. If you elect more than one minor, the minors may not have any courses in common.

If you want to have completion of a minor certified on your transcript, you must obtain a minor petition from your dean's office and file it no later than the deadline for filing for graduation. You can elect only one minor in a subject area. Requirements for the minor must be met by the time of graduation.

College of Engineering. Students in Engineering who plan to complete a minor must file a minor petition, available on the College of Engineering website at *http://engineering.ucdavis.edu/pages/current_students/advising/policy.html#minor*. The completed petition must be approved by the minor adviser and then turned into the Undergraduate Advising Office of the College of Engineering for certification at least one quarter prior to graduation.

There are currently four approved minor programs in the College of Engineering Information about these minors can be obtained by contacting the undergraduate adviser in the home department of each minor:

Department of Applied Science:

- Optical Science and Engineering

Department of Biological and Agricultural Engineering:

- Energy Science & Technology
- Energy Policy

Department of Civil and Environmental Engineering:

- Construction Engineering and Management

In addition, the Department of Computer Science offers a minor in Computer Science. For information, contact the Undergraduate Adviser in the Department of Computer Science (530) 752-7036.

ACADEMIC CREDIT

Units of Credit

Academic work at the university is measured by "units of credit." In conjunction with the letter grade you receive from the course instructor, units of credit give a fairly accurate evaluation of the amount of time you have devoted to a given subject. Units of credit also make it possible to anticipate the amount of work involved in a particular course and enable you to transfer from one campus or university to another without undue difficulty. To convert quarter units to semester units, multiply by 0.66; from semester to quarter units, multiply by 1.5.

Units of credit are assigned to courses based on 1 unit of credit for three hours of work by the student per week. Usually this means one hour of lecture or discussion led by the instructor and two hours of outside preparation by the student. In laboratory courses, two or three hours of work in the laboratory are normally assigned 1 unit of credit.

In most courses at UC Davis, the standard procedure prevails, so that a 3-unit course meets for three hours a week, a 4-unit course for four hours and so on. Courses that are an exception to this pattern may require additional class time or give more demanding assignments. If you have questions about the number of units assigned to a course, you should check the expanded course descriptions (available at your college, department, or on the Internet) or ask the instructor what is required in terms of outside reading, term papers, problem sets or field trips. These are not always spelled out completely in the *General Catalog*. By knowing the amount of work that will be required, you can plan your course load more systematically and realistically.

Credit by Examination

Under certain prescribed conditions, currently registered students in good standing may receive course credit by taking an examination without formally enrolling in a course. You may obtain a petition and a copy of the prescribed conditions from the Office of the University Registrar. The petition is subject to the approval of the instructor giving the examination and the department involved.

The completed petition, accompanied by a fee of $5.00, must be presented for final approval to the dean of your college or school,

or if you are a graduate student, to the dean of Graduate Studies. The completed petition must be submitted to the Office of the University Registrar no later than the business day before the date of the scheduled examination; petitions that are submitted after this date will be denied. Students who are approved by the Office of the University Registrar to take credit by examination shall be issued a permit to take the examination, which the student will present to the instructor at the time of the examination

The credit received for the examination may not duplicate any credit you have already earned toward your degree. You may not use credit by examination to repeat any course you have taken previously, regardless of the grade you received in that course. Credit earned by examination may not be applied towards satisfaction of the General Education requirement. The final examination results will be reported to the Office of the University Registrar, which will assign the appropriate grade and grade points to you. Since failure to pass the examination will be recorded as an *F*, you are encouraged to prepare fully for such an examination before attempting it. Optional *P/NP* or *S/U* grading is subject to approval by the appropriate dean.

You may also receive credit for learning in nonacademic settings through credit by examination.

To earn credit through the credit by examination process, the examination must be given by a UC Davis instructor and be for a course listed in the current *General Catalog*. Students are not eligible to take a credit by examination in a quarter in which they are not currently enrolled.

Concurrent Credit from Another Institution

A student may not obtain transfer credit for courses taken at a non-University of California campus in a term during which the student is registered as a full-time student at UC Davis. A variance can be obtained only by petitioning the dean of your college well in advance of the desired registration. When a variance is granted, units earned are counted toward minimum progress for the term in which the dual registration occurs. Summer Session courses are exempt from this regulation.

Students may gain credit for courses taken during the summer at other institutions, provided the courses parallel those given in the University of California. Assurance that such credit will be accepted, however, can be given only after the courses have been completed. You should arrange to have the transcripts of your Summer Session grades sent to Undergraduate Admissions for evaluation.

Intercampus Visitor Program

Qualified undergraduates may take advantage of educational opportunities on other University of California campuses as an Intercampus Visitor (ICV). This program enables students who have completed at least one year in residence on their home campus and have maintained a grade point average of at least 2.000 to take courses not available on their home campus, to participate in special programs, or to study with distinguished faculty members on other campuses of the university. Students who meet the above requirements should complete an application available in the Office of the University Registrar.

Summer Sessions

1350 Surge III
(530) 752-7622; *http://summer-sessions.ucdavis.edu*

Every summer, many students earn units, complete their undergraduate degrees, expand their knowledge, do research, take special study courses, meet prerequisites or take courses that are often over-enrolled during the academic year by participating in Summer Sessions at UC Davis.

Summer Sessions offers more than 700 lower and upper division course sections in a wide range of subject areas that provide full university credit transferable to most campuses. Since admission is open to virtually all adults, Summer Sessions traditionally attracts students from universities and colleges, high school graduates and many other qualified applicants. Admission to a summer session, however, does not guarantee or imply admission to the university's regular academic quarters.

Summer offerings include Special Programs that either occur off-campus or take place outside the normal six-week terms.

Summer session dates are listed in the Academic Calendar, on page 1, at *http://summer-sessions.ucdavis.edu* and in the *Class Schedule and Registration Guide (CSRG)*.

UC/CSU/Community College Cross Enrollment

If you are interested in taking a particular class at a nearby California State University or community college campus, you may now do so through the Intersegmental Cross Enrollment program. Enrollment is limited to one course per term and participating students need the approval of both the home and the host campus. Please note that the Los Rios Community College district is **not** participating in the program.

Senate Bill 361 requires that UC, CSU and the California Community Colleges permit students to enroll in one course per term at a campus of either of the other two systems on a space available basis at the discretion of the two campuses. This program aims to encourage community college students to enroll concurrently in courses offered at local universities, potentially increasing the number of community college transfers, including students from underrepresented groups.

Students must meet certain qualifications and be certified by their home campus as to eligibility, residence, fee, financial aid and health status. Generally, students will be allowed to add a class, if space is available, after the add/drop period on the host campus. To add a course, students must obtain the faculty member's approval and signature on a Cross-Enrollment form, available at their home campus Registrar's Office. The student takes the signed form to the Registrar's Office at the host campus for processing. If you are interested in participating, come to the Office of the University Registrar service counter in 12 Mrak Hall for more information.

Open Campus (Concurrent) Program

UC Davis Extension
1333 Research Park Drive
(800) 752-0881 or (530) 757-8777
http://www.extension.ucdavis.edu/opencampus

Most of the classes taught at UC Davis are available to members of the public through the Open Campus (Concurrent) Program on a space available basis. The enrollment limitations, deadlines and fee schedule are provided in the Open Campus brochure-available online, by mail or from the UC Davis Extension office. Students

previously registered at UC Davis who have not graduated may not enroll through Open Campus (Concurrent) until twelve months after withdrawing from UC Davis except with permission of the student's College Dean's Office. Upon admission or readmission to regular student status at UC Davis, the units and grade points earned when enrolled in Open Campus courses will count toward both the 180-unit undergraduate degree requirement and the UC GPA.

UC Davis Extension

1333 Research Park Drive
(800) 752-0881 or (530) 757-8777
http://www.extension.ucdavis.edu/

As the outreach arm of UC Davis, UC Davis Extension provides continuing education in numerous professional and academic fields. Details on Extension courses are available by visiting the Extension website, calling or coming to the Extension office. Students enrolled at UC Davis who wish to use UC Davis Extension courses, other than those offered through Open Campus (Concurrent), towards degree requirements must obtain written approval from the dean's office of their college before enrolling in the Extension courses. Upon approval students may apply a limited number of credits towards the undergraduate or graduate degree requirement.

EXAMINATIONS

Midterms

In undergraduate courses for which a midterm examination is required, each student has the right to take the midterm (or submit the take-home examination as opted by the instructor) during one of the regularly scheduled meetings of the class as published in the *Class Schedule and Registration Guide (CSRG)*. The scheduling of a midterm examination at a time other than a regularly scheduled class meeting requires mutual written consent of the instructor and each student registered in the course. A student who does not consent in writing to the different time must be permitted to take the examination (or submit the take-home examination) at the officially scheduled time. A student who consents in writing to the change of examination time waives the right to take the midterm at the officially scheduled time.

Final Examinations

Scheduling. The *Class Schedule and Registration Guide (CSRG)* lists the regulations and times that final examinations are to be held. Exams are set according to the day-and-start time of the classes offered during the quarter. This information is available in the *CSRG* each term so that you can avoid final examination conflicts. A student who has multiple exams on the same day may discuss the situation with the instructors of the courses. **Students are responsible for ensuring they do not have conflicting exams. There is no regulation mandating a change**.

Requirements. Except under certain specified circumstances, Academic Senate Regulations require that final examinations be given in all undergraduate courses. Final examinations may be given in graduate courses. Exceptions to the regulation would be independent study courses, courses that consist of laboratory work only and courses in which the examination has been waived by the Academic Senate Committee on Courses of Instruction.

At the instructor's option, the final examination in any course other than an on-line course may be wholly or in part of the take-home type. All examinations for on-line courses must be proctored to ensure that the person taking the examination is the student receiving credit. The writing time (in undergraduate courses) of a take-home and an in-class final examination together should not exceed three hours. In each course in which a final examination is required, the students have the right to take the final examination (and/or submit the take-home examination) at the time published in the *Class Schedule and Registration Guide (CSRG)*.

An instructor may release each student's original examination, or a copy, at any time. Otherwise, the instructor will keep the exams, or copies thereof, until the end of the next quarter and students may pick up their exams during this period.

For on-line courses, the instructor of each on-line class will be provided the option to have the final in the last time slot on the last day of finals or at a time on dead day. Students shall be notified of the time and place of the final on or before the first day of instruction.

Changing a Final Examination Date. An in-class final examination may not be rescheduled for a date earlier than the first day of finals week. The due date for a take-home final examination may not be rescheduled for a date earlier than the first day of finals week. The scheduling of an examination at a time other than the specified time requires the written mutual consent of the instructor and each student involved in the change. Any student who does not consent in writing to a different time will be permitted to take an examination (or submit the instructor-opted take-home examination) at the officially scheduled time. A student who consents in writing to a change in the final examination time waives the right to take the examination as originally scheduled. Departures from the published examination schedule should be carried out so as not to disadvantage students who are unable to accept the changed schedule.

A student who is improperly denied the right to take a required final examination on the published date (or submit the take-home examination as opted by the instructor) may file a petition with the Executive Council of the Davis Division of the Academic Senate by the end of the next regular term for appropriate action.

Disabilities. Students with documented disabilities may be entitled to in-class accommodations. The student shall provide the instructor with a letter from the Student Disability Center (SDC) recommending those academic accommodations that the instructor is responsible for providing. Students must request accommodation as soon as possible, to allow the university reasonable time to evaluate the request and offer necessary adjustments. No accommodations shall alter the nature of the academic demands made of the student nor decrease the standards and types of academic performance, nor require facilities or personnel that cannot reasonably be provided. SDC coordinates with the Office of the University Registrar to reserve a classroom for examinations for students with documented disabilities during finals week. The instructor should consult with the student and SDC on any questions or concerns.

Religious Observances. UC Davis seeks to accommodate any student who, in observance of a religious creed, encounters an unavoidable conflict with a test or examination schedule. The student is responsible for providing, in writing no later than the beginning of the quarter, notification of a potential conflict to the individual responsible for administering the examination and requesting accommodation. Instructors will consider such requests on a case-by-case basis and determine whether such con-

flicts can be resolved without imposing on the instructor or the other students in the class an undue hardship, which cannot be reasonably avoided. If so, the instructor will determine, in consultation with the student, a time during which the student can take the test or examination without incurring a penalty or violation to the student's religious creed.

GRADES

Every instructor is required to assign a grade for each student enrolled in a course. The following grades are used to report the quality of a student's work at UC Davis:

A	excellent
B	good
C	fair
D	barely passing
F	not passing (work so poor that it must be repeated to receive recognition)
P	passed (grade *C*– or better)
NP	not passed
S	satisfactory
U	unsatisfactory
I	incomplete (work is satisfactory but incomplete for a good cause)
IP	in progress

The grades *A*, *B*, *C* and *D* may be modified by a plus (+) or minus (–).

Grade Points

Grade points are assigned each letter grade as follows:

A+ = 4.000	*B*– = 2.700	*D* = 1.000
A = 4.000	*C*+ = 2.300	*D*– = 0.700
A– = 3.700	*C* = 2.000	*F* = 0.000
B+ = 3.300	*C*– = 1.700	*P/NP* = n/a
B = 3.000	*D*+ = 1.300	*S/U* = n/a

Grade Point Average (GPA)

The grade point average is computed on courses taken at the University of California. The value of grade points over units attempted determines your grade point average. The grade point balance represents the number of grade points above or below a *C* average. The grades *IP*, *P*, *S*, *NP* and *U* carry no grade points and are not included in grade point computations. Incomplete (*I*) grades are not included in the GPA at the end of the quarter, but are counted as *F* in determining if a bachelor's degree candidate has earned the minimum 2.000 GPA required for graduation.

A student at UC Davis is expected to maintain a *C* (2.000 GPA) or better in all work undertaken in the university. If you fall below a *C* average, you are considered "scholastically deficient;" see Probation and Dismissal, on page 80.

Passed/Not Passed (P/NP) Grading

Subject to regulation by the faculties of the colleges and schools, an undergraduate student **in good standing** may request to take specific courses on a Passed/Not Passed basis. Such requests must be submitted and confirmed before the 25th day of instruction.

The grade *P* is assigned for a grade of *C*– or better. Units thus earned are counted in satisfaction of degree requirements but are not counted in determining your grade point average.

The intent of this option is to encourage exploration in areas in which you have little or no previous experience by alleviating grading pressures. **The maximum number of units graded *P* that will be accepted for degree credit is one third of the units completed in residence on the UC Davis campus**. Consequently, at least two thirds of the units completed in residence at UC Davis and presented in satisfaction of degree requirements must be in courses taken for a letter grade.

In specific approved courses, instructors will assign only Passed or Not Passed grades. Such courses count toward the maximum number of units graded *P* allowable toward the degree. If you are planning to take courses on a *P/NP* basis, you should also familiarize yourself with the requirements of your particular school or college, which may have placed conditions or restrictions in addition to the university requirements. If you plan to attend graduate or professional school, you should consult with Pre-Graduate/Pre-Professional Advising Services regarding Passed/Not Passed grading.

If you elect the *P/NP* grading option for courses graded upon completion of a two- or three-quarter sequence (in-progress grading), a petition must be submitted before half of the time covered by the *IP* grading has elapsed. The *P/NP* grading will then be in effect for the entire course sequence.

If you receive a *D* or an *F* in a course, you may not repeat it using the *P/NP* option. If you receive an Incomplete in a course you took for a letter grade, you may not complete the course on a Passed/Not Passed basis.

College of Agricultural and Environmental Sciences. The Passed/Not Passed option should be used only for elective courses, not for courses taken to fulfill major requirements. An *NP* grade in a course required by the major could prevent graduation. When in doubt, check with your faculty adviser before electing to take a course on a Passed/Not Passed grading basis.

College of Biological Sciences. All courses used to satisfy major requirements must be taken on a letter-graded basis, unless courses are only offered on a Passed/Not Passed basis. Courses taken before Fall 2006 on a Passed/Not Passed basis will be accepted in fulfillment of major requirements. Per university regulations, all courses used to fulfill General Education requirements must be taken for a letter grade.

College of Engineering. Students in the College of Engineering may not take any course used to satisfy a degree requirement, or any course offered by the College of Engineering on a *P/NP* basis. College of Engineering students are unable to select the *P/NP* option in SISWeb. Engineering students wishing to take a non-engineering course that is not needed to satisfy a degree requirement can obtain a *P/NP* petition in the Undergraduate Advising Office in 1050 Kemper Hall.

College of Letters and Science. Students enrolled in the College of Letters and Science are subject to an additional limitation on the number of units that may be completed employing the Passed/Not Passed grading option; see Bachelor's Degree Requirements for the college in the Undergraduate Education chapter. Graduating seniors and other students planning to undertake graduate or professional studies, should consult an adviser before electing for Passed/Not Passed grading in courses required for the major program.

Satisfactory/Unsatisfactory (S/U)

The grade of *S* is awarded to graduate students for work in graduate courses that otherwise would receive a grade of *B–* or better and for work in undergraduate courses that otherwise would receive a grade of *C–* or better.

Graduate students, under certain circumstances, may be assigned grades of *S* or *U*, but units earned in this way will not be counted in calculating the grade point average. Petitions to elect *S/U* grading are available from the Graduate Studies Office and must be signed by your graduate adviser. Graduate students may petition to take no more than one course per quarter on an *S/U* grading basis. A graduate course in which a *C*, *D* or *F* grade is received may not be repeated with the *S/U* option.

In specific approved courses, instructors will assign only Satisfactory or Unsatisfactory grades. Such courses count toward the maximum number of units graded *S* allowable toward the degree, as specified by each degree program.

In-Progress (IP) Grading

For a course extending over more than one quarter (designated "deferred grading only, pending completion of sequence" in course descriptions), evaluation of student performance is deferred until the end of the final quarter. Provisional grades of IP are assigned in the intervening quarters and are replaced with the final grade at the completion of the sequence. In order to gain credit toward graduation, a student must successfully complete the entire sequence. For electing *P/NP* grading for a course graded in-progress, see Passed/Not Passed (P/NP) Grading, on page 78.

Incomplete Grades

The grade of *I* may be assigned when a student's work is of passing quality and represents a significant portion of the requirements for a final grade, but is incomplete for a good cause as determined by the instructor; good cause may include current illness, serious personal problems, an accident, a recent death in the immediate family, a large and necessary increase in working hours or other situations of equal gravity.

In courses listed in the *General Catalog* as being letter graded, "passing quality" means "of *D-* quality or better." This standard holds in such courses whether or not the student has elected to take the course on a Passed/Not Passed or Satisfactory/Unsatisfactory basis. For courses listed in the *General Catalog* as being graded on a Passed/Not Passed or Satisfactory/Unsatisfactory basis only, the completed work must be of a quality consistent with a grade of Pass or Satisfactory, respectively.

You may replace an *I* grade with a passing grade and receive unit credit (and grade points if the instructor assigns a letter grade) provided you satisfactorily complete the course work as specified by the instructor. In order to change your records, you must obtain a petition from the Office of the University Registrar and present it to your instructor for completion and mailing.

An *I* grade must be replaced with a letter grade (or *P* or *S* grade) before the end of the third succeeding quarter (excluding summer sessions) of the student's academic residence, or the grade will revert to an *F* (or *NP* or *U*). If a student's degree is conferred before the expiration of the time limit for an *I*-grade conversion, the graduated student shall have until the end of the third quarter succeeding the quarter in which the I grade was assigned to replace the *I* grade. If the grade is not replaced by then, the *I* grade will remain on the student's record.

You may not re-enroll for credit in a course for which an *I* grade has been assigned. An undergraduate student whose record shows more than 16 units of *I* grades will be subject to disqualification. A graduate student who accumulates more than eight units of *I* grades will be subject to probation.

Incomplete grades will not be included in your grade point average at the end of a quarter. However, at the time of graduation, any remaining *I* grades are included when your grade point average is computed in order to determine whether you have achieved the 2.000 average required for the bachelor's degree. An Incomplete grade, in these computations, has the same effect as a grade *F*, *NP* or *U*, depending on which option you have exercised. Therefore, it is recommended that students not delay the clearance of incomplete grades so as not to jeopardize graduation.

Retroactive Grade Changes

All grades except *I* and *IP* are final when filed by an instructor at the end of the quarter. No final grade except *I* may be revised by examination or the submission of additional work after the close of the quarter.

If a clerical or procedural error in the reporting of a grade by the instructor can be documented, you may request a change of grade with a petition available from department offices. The request must be made by the fifth week of the following quarter.

Grade changes for "clerical" errors (such as incorrect addition of points), upon documentation, are automatically granted. Requests to interchange *P*, *NP*, *S* or *U* grades with normal letter grades based upon student need (such as to allow graduation or to meet entrance requirements for professional school) do not involve clerical or procedural errors and are automatically denied. Thus, students should exercise the Passed/Not Passed or Satisfactory/Unsatisfactory grading options with caution.

Students are reminded of their responsibility to be aware of the procedures and regulations contained in the *General Catalog* and the *Class Schedule and Registration Guide (CSRG)*, to verify their class schedules, and to familiarize themselves with the expectations of their instructors. No changes, except completion of an *I* grade as noted above, can be made to the student's record once he or she has graduated.

Repeating Courses

Undergraduate students may only repeat courses in which they received a *D*, *F* or *NP*. Courses in which students received a grade of *D* or *F* may not be repeated on a *P/NP* grading basis. (Courses in which a grade of *NP* was received may be repeated on a *P/NP* grading basis.)

Degree credit for a repeated course will be given only once, but the grades assigned for both the first and second time a course is taken

will appear on the student's transcript. In computing the GPA of undergraduates who have received a grade of *D*, *F* or *NP*, only the grade and corresponding grade points earned the second time a course is taken will be used, up to a maximum of 16 units for all repeated courses. After the 16-unit maximum is reached, the GPA shall be based on all grades assigned and total units attempted.

Repeating a course more than once requires approval by the appropriate college dean. Departments may restrict the repetition of a course if it is a prerequisite to a course the student has already completed with a grade of *C–* or better.

Graduate students, with the consent of the appropriate graduate adviser and the dean of Graduate Studies, may repeat any course in which they received a *C*, *D*, *F* or *U*, up to a maximum of 9 units for all courses repeated. Courses in which a grade of *C*, *D* or *F* has been earned may not be repeated on an *S/U* basis. Courses in which a grade of *U* as received may be repeated on an *S/U* basis.

Degree credit for a repeated course will be given only once, but the grades assigned for both the first and second time a course is taken will appear on the student's transcript. In computing the GPA of graduate students who have received a grade of *C*, *D* or *F*, only the most recently earned grade for each course and corresponding grade points will be used, up to a maximum of 9 units for all courses repeated. After the 9-unit maximum is reached, the GPA shall be based on all grades assigned and total units attempted.

Mid-Term Grade Standing

Students wishing to know their grade at the mid-quarter should ask the instructor. Those who have deficient grades (*D*, *F* or *NP*) are urged to confer with their advisers.

Final Grades

Grades are generally available about three weeks after a quarter has ended. You can check your grades through SISWeb; see *http://sisweb.ucdavis.edu*.

Transcripts

A record of each student's academic work at UC Davis is retained permanently by the Office of the University Registrar. Copies of your official transcript may be obtained from that office for $10.00 a copy. Application for a transcript of record should be made at least two weeks in advance of the time needed. For more information, see the Office of the University Registrar website at *http://registrar.ucdavis.edu*.

Transcripts of all work done through UC Davis Extension or concurrent enrollment must be requested directly from the UC Davis Extension Office, 1333 Research Park Drive, Davis, CA 95616. Transcripts of work completed at another campus of the university or at another institution must be requested directly from the campus or institution concerned.

PROBATION AND DISMISSAL

The following provisions apply to all undergraduates. Graduate and professional students with scholarship deficiencies are subject to action at the discretion of their respective deans.

Scholastic Deficiencies

A student will be placed on probation or subject to disqualification for failure to meet qualitative or quantitative standards of scholarship.

Qualitative Standards. The qualitative standards of scholarship require that a student maintain a *C* average (2.000) or better for all work undertaken in the university and for the work undertaken in any one quarter.

A student will be placed on **probation for qualitative reasons** if, at the end of any quarter, the student's grade point average (GPA) is:

- Less than 2.000, but not less than 1.500, for the quarter

or

- Less than 2.000 for all courses taken within the University of California

A student will be **subject to disqualification for qualitative reasons** if, at the end of any quarter,

- The student's grade point average is less than 1.500 for the quarter,

or

- The student's grade point average is less than 1.500 for all courses taken within the University of California,

or

- The student has attempted more than 16 units graded I (Incomplete),

or

- The student has spent two consecutive quarters on academic probation.

Quantitative Standards. The quantitative standards, referred to as minimum progress requirements, define scholarship in terms of the number of units that you must satisfactorily complete. It is expected that a student will earn the 180-unit minimum degree requirement within 12 quarters (four years). This means students are expected to complete, on average, 15 units per quarter.

Because occasions arise which prevent students from achieving expected progress towards the degree, the campus has established minimum progress requirements, to which students must adhere. To meet minimum progress, a full-time regular undergraduate is required to maintain an average of at least 13 units passed over all quarters of enrollment. Minimum progress is calculated at the end of every Spring Quarter for the preceding three quarters (Fall, Winter, Spring) comprising the academic year. Quarters during that period for which a student was officially approved for part-time status are omitted from the minimum progress calculation.

The following courses may be counted toward unit minimum progress:

- Required non-credit courses, e.g., Mathematics B, will be evaluated according to the "Carnegie unit" rule and counted as units passed, although these courses shall not be applied toward the satisfaction of baccalaureate degree requirements.
- Repeated courses passed to improve *D* or *F* grades up to a maximum of 16 units.
- Courses passed in Summer Sessions at UC Davis or at another accredited school and transferred to UC Davis will be counted as units passed (applied to the next full-time quarter of enrollment immediately following the summer session).
- Courses passed by examination in accordance with policies established by the Divisional Committee on Courses (applied to quarter in which exam is taken).
- Courses that are *IP* (in progress) will be counted as units passed.

- Courses graded *I* will be counted as units passed when replaced by a passing grade (applied to the quarter in which the *I* grade is received).

A student will be placed on **probation for quantitative reasons** if, at the end of any Spring Quarter, the minimum progress calculation for the preceding academic year shows that the student passed an average of less than 13 units but greater than or equal to 12 units per quarter.

A student will be subject to **disqualification for quantitative reasons** if, at the end of any Spring Quarter, the minimum progress calculation for the preceding academic year shows that the student passed an average of less than 12 units per quarter.

For every student who fails to meet minimum progress at the end of Spring Quarter, a "degree progress average" will be calculated at the close of the next full-time quarter of enrollment at UC Davis. The degree progress average is defined as the quotient of the number of units passed during all full-time quarters from the initial quarter of matriculation at UC Davis divided by the number of full-time quarters completed at UC Davis.

A student whose degree progress average is less than 13 units shall be "subject to disqualification for quantitative reasons." A student whose degree progress average is 13 or more units shall not be "subject to disqualification for quantitative reasons."

If a student fails to make minimum progress at the end of Spring Quarter, the degree progress average shall be calculated each subsequent full-time quarter of enrollment as long as the student is "subject to disqualification for quantitative reasons." A student who is "subject to disqualification for quantitative reasons" at the end of two consecutive full-time quarters of enrollment shall be disqualified from the university.

In the case of probation or subject to disqualification, for either qualitative or quantitative reasons, the official transcript will state "not in good standing." Once a student has met qualitative and quantitative standards of scholarship, or has satisfied all requirements for graduation, the notation will be removed from the transcript.

Dismissal

Dismissal for either qualitative or quantitative reasons (defined above) is based on the decision of the dean of the college in which the student is enrolled. Such dismissal is from the University of California system and not simply the college or the UC Davis campus. Should a former UC Davis student later wish to be readmitted to the UC Davis campus, the authority to do so rests with the dean of the college from which the student was dismissed. If a student is dismissed from their college, they will automatically receive a full refund of registration fees paid for that term.

Students should go to the dean's office of their college if they need academic advising about probation and dismissal.

A student will be placed on probation or subject to disqualification for failure to meet qualitative or quantitative standards of scholarship.

HONORS AND PRIZES

Scholarships

1100 Dutton Hall
(530) 752-2804; *http://financialaid.ucdavis.edu/scholarships/*

By mail:
Scholarship Office
University of California
One Shields Avenue
Davis, CA 95616-8696

Students with outstanding academic records who show promise of continued scholarly achievement are encouraged to apply for scholarship recognition and awards. Awards include a financial honorarium or stipend.

Deans' Honors Lists

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

Graduation Honors

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

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

Grade point averages from the winter quarter prior to graduation are used to determine the averages that will earn an honors designation. Following are the averages for winter quarter 2010. These averages will be used through winter quarter 2011.

Grade Point Average by College

Percent Determining Cut-Off Point	Agricultural & Environmental Sciences	Biological Sciences	Engineering	Letters and Sciences
2%	3.902	3.948	3.923	3.894
3%	3.869	3.925	3.887	3.850
4%	3.822	3.900	3.854	3.814
6%	3.769	3.833	3.770	3.750
8%	3.694	3.773	3.700	3.705
12%	3.595	3.668	3.594	3.620
16%	3.517	3.588	3.494	3.540

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

College of Letters and Science. Graduation with "honors" requires that a student meet the appropriate grade point requirement described in the above table for all UC courses completed. Students who meet the grade point requirement for graduation with honors, and who complete the Honors Program of the College of Letters and Science, may be recommended by their depart-

ments for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major and in the honors project in particular. Graduating students will not be awarded honors with the bachelor's degree if more than eight units of grade *I* (Incomplete) appear on their transcripts. The College Committee on Honors may consider exceptions to this condition. Petitions for this purpose should be submitted to the deans' office.

The Honors Program of the College of Letters and Science

The Honors Program in the College of Letters and Science permits students to pursue a program of study in their major at a level significantly beyond that defined by the normal curriculum. It represents an opportunity for the qualified student to experience aspects of the major that are representative of advanced study in the field. Successful completion of the College Honors Program is a necessary prerequisite to consideration for the awarding of high or highest honors at graduation.

Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade point average of 3.500 in courses counted toward the major. Other prerequisites for entrance into the program are defined by the major. The program consists of a project whose specific nature is determined by consultation with the student's major adviser. It may involve completion of a research project, a scholarly paper, a senior thesis, or some comparable assignment depending on the major. The project will have a minimum duration of two quarters and will be noted on the student's record by a variable unit course number or special honors course designation. Successful completion of the honors program requires that a minimum of six units of credit be earned in course work for the project.

The Honors Program of the College of Engineering

An Honors Program is available to qualified students in the Chemical Engineering, Biochemical Engineering, and Materials Science and Engineering majors. The Honors Program is also available to the dual majors: Chemical Engineering/Materials Science and Electrical Engineering/Materials Science and Engineering, and Mechanical Engineering/Materials Science and Engineering. The Chemical Engineering and Materials Science Honors Program is a four-year program designed to challenge the most talented students in these majors. Students invited to participate will take a one-unit honors seminar in their Freshman year and will enroll in various one-unit honors courses. In the upper division, students will complete either an honors thesis or a project that might involve local industry (Chemical Engineering 194 HA, HB, HC). Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

University Honors Program

http://honors.ucdavis.edu/

The University Honors Program (UHP) at UC Davis is designed to meet the needs of highly-motivated and academically-talented students. Through enriched educational opportunities, the UHP seeks to provide students with an undergraduate education that will engage them in active learning and nurture and promote critical thinking and oral and written expression.

Through dynamic interdisciplinary curriculum and innovative teaching, students work closely with distinguished faculty to create a vibrant community of scholars dedicated to pursuing academic excellence. The UHP offers students many of the benefits of a small college experience within the context of a major research university.

The program's multifaceted approach to learning provides students distinct pathways to becoming part of this prestigious honors program.

Davis Honors Challenge

(530) 752-2335; *http://dhc.ucdavis.edu*

A track within the University Honors Program (UHP), the Davis Honors Challenge (DHC) is a campuswide honors program for highly motivated students who are interested in enhancing their education through special courses, closer contact with faculty and dynamic interaction with academic peers.

DHC courses are limited in size so that participants receive substantial individual attention from faculty. In return, students are expected to participate actively in analyzing real world problems. Honors courses and small honors sections of regular courses also encourage individual student participation and self-challenge. Students satisfactorily completing the program will receive transcript notation for each academic year of participation.

First-year students participating in the DHC take one honors course, one orientation seminar and one DHC freshman seminar. Second-year students take one honors course, one problem oriented interdisciplinary seminar, and one DHC freshman seminar or honors contract. Third-year students are required to complete two honors contracts and one upper division honors seminar. Fourth-year students participate in a year-long team project to identify real world problems, apply research, critical thinking, problem-solving and communication skills to develop viable solutions for their outside party. They also have the option of participating in an honors thesis project. Transfer students complete an acclimation seminar and two honors contracts.

Other components of the DHC include an honors residential hall living learning community and various workshops and events. Each of these programs is designed to enhance students' college experience.

Entering first-year and transfer students who file a "Statement of Intent to Register" at UC Davis will be e-mailed detailed information about the DHC application process. Continuing students may obtain information and an application from the DHC Office after the start of spring quarter.

Integrated Studies Honors Program

(530) 752-9760; *http://integratedstudies.ucdavis.edu*

The Integrated Studies Honors Program (ISHP) is one track within the University Honors Program (UHP) and is a campuswide, invitational, first-year residential honors program, now in its fifth decade. Course offerings oriented toward research opportunities are also offered beyond the freshman year. During the freshman year, the Integrated Studies Honors Program offers specially designed, interdisciplinary honors courses that satisfy General Education requirements. Approximately 120 students live in an Academic Residential Community on campus and take two limited-enrollment honors courses (open only to Integrated Studies Honors Program students) and two seminars.

Holders of Regents Scholarships, the university's most prestigious scholarship awards, are guaranteed places in the Integrated Studies

Honors Program. Other highly qualified students are also invited to participate and are selected to create a balanced community of students from all four undergraduate colleges.

Prizes and Awards

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

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

College of Agricultural and Environmental Sciences. Each year, the outstanding graduating senior in the College is awarded a silver medal, known as the "Agricultural and Environmental Sciences Medal." Scholastic excellence (in a minimum of six quarters at UC Davis) is the primary basis for choosing the recipient. The Mary Regan Meyer Prize is awarded to an outstanding graduate who has demonstrated expertise and an interest in serving humanity. The Charles E. Hess Award is awarded to the graduate with the most noteworthy record of public/community service while at UC Davis. The Kinsella Memorial Prize, in honor of John E. Kinsella, is awarded annually to an outstanding individual who submits his or her Ph.D. dissertation during the spring, fall or winter quarter immediately preceding the due date for nomination.

College of Biological Sciences. Each year the College Medal is awarded to one outstanding graduating senior. Academic excellence is the primary basis for selecting medal nominees. The Undergraduate Student of the Year is awarded to a graduating senior based on the criteria of academic excellence, research activity and involvement in service to the campus or community. For additional information regarding college awards, please contact the Dean's Office.

College of Engineering. Each year, outstanding senior students in engineering are selected by their grade point averages as nominees for the M.S. Ghausi Medal. Academic excellence is the primary basis for selecting the recipient of the award. The Zuhair Munir Award is given to the student who has submitted the year's best engineering doctoral dissertation. Established in 1999, the award honors former Dean of the College, Zuhair Munir, who led the UC Davis College of Engineering from 2000 to 2002 and acted as its Associate Dean for Graduate Studies for 20 years. More than 25 faculty, staff and friends of the College of Engineering contribute to this endowed fund.

College of Letters and Science. Graduating seniors with a distinguished academic record may be recommended by the faculty as nominees for the College's Herbert A. Young Medal. Each June, one medalist is selected from among the graduates of the current academic year. The Leon H. Mayhew Award is conferred upon the outstanding graduate majoring in the arts or humanities, preferably music, art, or literature. Academic excellence is the primary basis for selecting the recipients of these awards. The Lawrence J. Andrews prize is awarded to a student entering the senior year who not only has achieved academic excellence but who also has demonstrated interests outside of pure scholarship.

Chancellor's Award for Excellence in Undergraduate Research

This prestigious award recognizes a graduating senior who has distinguished him/herself through their excellence in undergraduate research. The winner, chosen for completing research or scholarship in any academic subject while at UC Davis, is announced and awarded a special plaque at commencement ceremonies in June. In conjunction with the Chancellor's Award, Professor Dean Simonton of UC Davis' Department of Psychology established an endowment for funding a cash prize for each year's student recipient. An award is also given each year to a faculty mentor for his/her outstanding contribution to undergraduate research. For more information, see *http://undergraduatestudies.ucdavis.edu/research.cfm*.

Honorary Societies

Election to an honorary society is one of the most prestigious awards a student can receive. At UC Davis, the following honorary societies are represented:

- Alpha Kappa Delta (Sociology)
- Alpha Omega Alpha (Medicine)
- Alpha Zeta (College of Agricultural and Environmental Sciences)
- Delta Phi Alpha (German)
- Gamma Sigma Delta (College of Agricultural and Environmental Sciences; College of Biological Sciences)
- Golden Key (All colleges and schools)
- Kappa Omicron Nu (Family and Consumer Sciences)
- The National Society of Collegiate Scholars (All colleges and schools)
- Omicron Delta Epsilon (Economics)
- Order of Omega (Fraternities-Sororities)
- Order of the Coif (Law)
- Phi Alpha Theta (History)
- Phi Beta Kappa (College of Letters and Science)
- Phi Kappa Phi (All colleges and schools)
- Phi Sigma (Biological Sciences)
- Phi Zeta (Veterinary Medicine)
- Pi Delta Phi (French)
- Pi Mu Epsilon (Mathematics)
- Pi Sigma Alpha (Political Science)
- Prytanean Honor Society (All colleges-undergraduate women only)
- Psi Chi (Psychology)
- Sigma Pi Sigma (Physics)
- Sigma Xi (All colleges and schools-research)
- Tau Beta Pi (Engineering)

LEAVING UC DAVIS

Graduation

Each candidate for an undergraduate degree must file an **Application for Graduation** with the Office of the University Registrar for the quarter in which the candidate plans to receive the degree; see *http://registrar.ucdavis.edu/graduation*. The dates for campus filing are published in the Academic Calendar, on page 1, and the quarterly *Class Schedule and Registration Guide (CSRG)*.

Students in the College of Agricultural and Environmental Sciences must have their Major Certification form evaluated by the dean's office before their candidacy for a degree can be finalized; see Bachelor's Degree Requirements for the college in the Undergraduate Education chapter.

Students in the College of Engineering must register at the College of Engineering website (*http://engineering.ucdavis.edu*) in addition to filing with the Office of the University Registrar (*http://registrar.ucdavis.edu*). See the College of Engineering website or call the Undergraduate Advising Office at (530) 752-1979 for Engineering filing deadlines.

Graduating students who wish to participate in the Commencement Ceremony must register to do so with their college by the filing deadline for that term. For links to each college's registration website, see *http://registrar.ucdavis.edu/graduation*. Commencement Ceremonies are held twice a year, in the fall (December) and spring (June).

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

Leave of Absence: Planned Educational Leave Program (PELP)

The Planned Educational Leave Program allows any registered student-undergraduate or graduate-to temporarily suspend academic work at UC Davis. Undergraduates may take one such leave during their academic career at UC Davis and that leave is limited to one quarter in duration. For graduate students the maximum leave is up to one year. Undergraduates apply for PELP at the Office of the University Registrar. Graduate students apply through their departments and professional students apply through their Dean's office.

Applications for PELP may be filed as late as the tenth day of instruction during the quarter for which the student is requesting a leave. However, approved applications submitted after the first day of instruction will entitle you to only a partial retraction of fees assessed, which may provide a refund in accordance with the Schedule of Refunds. The Schedule of Refunds refers to calendar days beginning with the first day of instruction. The effective date for determining a refund of fees is the date the completed and approved PELP form is returned to the Office of the University Registrar; see the Fees, Expenses and Financial Aid chapter.

An application fee of $60 is charged to your account when you enroll in the PELP program.

While students may receive academic credit at other institutions and transfer this credit to UC Davis (subject to rules concerning transfer credit), participants are reminded that the intent of the program is to "suspend academic work." Therefore, students are urged to carefully evaluate the desirability of taking academic work while away from the campus during PELP. Students enrolled in PELP are not eligible to enroll in Open Campus (concurrent) courses at the UC Davis campus, or to otherwise earn academic credit at UC Davis during the PELP leave.

Readmission is guaranteed assuming you resume academic work by enrolling in courses, satisfying any holds that may have been placed on your registration and paying your registration fees by the established deadlines for the quarter specified for return on your approved PELP application. Students who do not return by the specified quarter will be automatically withdrawn from the university.

You will not be eligible to receive normal university services during the planned leave. Certain limited services, however, such as placement and student employment services, counseling, and faculty advising are available. Students on PELP may purchase a health care card from the Student Health Service and may retain library privileges by purchasing a library card. International students should consult Services for International Students and Scholars to find out how the PELP will affect their status. Grants and other financial aids will be discontinued for the period of the leave, but effort will be made, where legally possible, to allow you to renegotiate loan payment schedules and to ensure the availability of financial aid upon your return.

Withdrawal

Withdrawals may be granted by the university for emergency reasons or for good cause. Petitions for withdrawal (Notice of Cancellation/Withdrawal) are available at the Office of the University Registrar. A percentage of fees may be retracted and, if you have paid those fees, you may be entitled to a refund in accordance with the Schedule of Refunds; see the Fees, Expenses and Financial Aid chapter. The effective date for determining a refund of fees is the date the completed withdrawal form is filed with the Office of the University Registrar. After filing your withdrawal form, you must complete an Exit Interview with Student Accounting; see the Student Accounting website.

If you are receiving financial aid, you must report your change of status immediately, in person or by mail, to the Financial Aid Office. If you are receiving veterans benefits, you must also report your withdrawal to the Veterans Affairs Office.

College of Engineering. Engineering students planning to withdraw from the University are strongly advised to meet with an adviser in the Undergraduate Advising Office, in 1050 Kemper Hall or call (530) 752-1979, to discuss readmission requirements prior to withdrawing.

Retroactive Withdrawal. Petitions for retroactive withdrawals may be obtained from the Office of the University Registrar. Petitions are subject to approval by the Grade Change Committee of the Davis Division Academic Senate. Reasons for seeking such are medical problems, severe emotional difficulties, or death or severe illness in the immediate family. Petitions should include a detailed account of the problem, appropriate documentation and an adequate explanation of why withdrawal was not taken during the quarter in which the problem occurred.

UNDERGRADUATE EDUCATION

UNDERGRADUATE EDUCATION

Students may choose from more than 100 major programs and more than 90 minor programs in a wide variety of disciplines offered by the four undergraduate colleges.

COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES

Office of the Dean
150 Mrak Hall
(530) 752-0108; *http://www.caes.ucdavis.edu*

Major programs in the College of Agricultural and Environmental Sciences highlight the multiple connections among agricultural sciences, environmental sciences and human sciences within the larger context of the quality of life in the global economy. The majors fall into three broad areas of study described below. The College of Agricultural and Environmental Sciences also offers two collegewide degree programs and two collegewide non-degree programs.

The Undergraduate Programs

Agricultural Sciences

These majors prepare students in animal biology and the management of environmental resources as needed to develop sustainable animal production technologies. Also considered is the impact of production and management processes on animal health and welfare, human diet and health, and the natural environment.

The majors that focus on plant science provide a strong background in the context of agricultural and environmental systems and societal needs; ecological understanding of food and fiber production systems; biological and economic principles that underlie management decisions in agribusiness; and a basic background in all areas of plant biology, including plant development, plant protection, biotechnology and post-harvest physiology.

Majors:

- Agricultural and Environmental Education, B.S
- Animal Biology, B.S.
- Animal Science, B.S.
- Animal Science and Management, B.S.
- Avian Sciences, B.S.
- Biotechnology, B.S.
- Entomology, B.S.
- Plant Sciences, B.S.
- Viticulture and Enology, B.S.

Minors:

- Agricultural Pest Management
- Applied Computing and Information Systems (Plant Sciences)
- Animal Biology (Animal Science)
- Animal Genetics (Animal Science)
- Apiculture Entomology (Entomology)
- Aquaculture (Animal Science)
- Avian Sciences
- Dairy/Livestock (Animal Science)
- Environmental Horticulture (Plant Sciences)
- Equine (Animal Science)
- Forensic Entomology
- Fungal Biology and Ecology (Plant Pathology)
- Insect Biology (Entomology)
- Insect Ecology and Evolution (Entomology)
- Medical-Veterinary Entomology (Entomology)
- Nematology
- Precision Agriculture (Biological and Agricultural Engineering)

Environmental Sciences

These majors focus on the broad facets of the human and natural environments and their interactions. They draw on the social, physical and biological sciences as needed to prepare students for leadership and advanced studies in the areas of natural resource management, environmental quality and stewardship, community planning and design, and public policy decision making.

Majors:

- Agricultural and Environmental Education, B.S
- Atmospheric Science, B.S.
- Ecological Management and Restoration, B.S.
- Environmental Horticulture and Urban Forestry, B.S.
- Environmental Science and Management, B.S.
- Environmental Policy Analysis and Planning, B.S.
- Environmental Toxicology, B.S.
- Hydrology, B.S.
- Landscape Architecture, B.S.
- Soil and Water Science, B.S.; see Environmental Science and Management
- Wildlife, Fish, and Conservation Biology, B.S.

Minors:

- Atmospheric Science (Land, Air, and Water Resources)
- Environmental Policy Analysis (Environmental Science and Policy)
- Environmental Toxicology
- Geographic Information Systems (Biological and Agricultural Engineering)
- Geographic Studies (Environmental Design)
- Hydrology (Land, Air, and Water Resources)
- Landscape Restoration (Plant Sciences)
- Soil Science (Land, Air, and Water Resources)
- Wildlife, Fish, and Conservation Biology

Human Sciences

These majors foster a deeper understanding of the multiple connections between scientific and cultural issues in the context of human health and the quality of life. Basic physical and biological science, social science, design, and economic principles are taught in this context, linking food and fiber production to consumption, emerging knowledge to societal applications and policy, and human development to active, informed citizenship. Emphasis is on linking resources for humans with humans as resources. Physiological, social and aesthetic dimensions of the human experience are explored.

Majors:

- Agricultural and Environmental Education, B.S
- Clinical Nutrition, B.S.
- Community and Regional Development, B.S.
- Fiber and Polymer Science, B.S.
- Food Science, B.S.
- Human Development, B.S.
- Managerial Economics, B.S.
- Nutrition Science, B.S.
- Textiles and Clothing, B.S.

Minors:

- Aging and Adult Development (Human and Community Development)
- Community Development (Human and Community Development)
- Community Nutrition (Nutrition)
- Fiber and Polymer Science (Textiles and Clothing)
- Food Service Management (Nutrition)
- Human Development (Human and Community Development)
- Managerial Economics (Agricultural and Resource Economics)
- Nutrition and Food (Nutrition)
- Nutrition Science (Nutrition)
- Textiles and Clothing

Collegewide Programs

The collegewide programs cut across all of the above areas, providing students in a variety of majors with a background in such areas as public policy, economic principles in a global context and the intersections among environmental, agricultural and socio-economic issues. Collegewide programs also include non-degree, lower division curricula aimed at providing students with a foundational knowledge base and the potential for developing individualized programs.

Majors:

- Individual Major, B.S. (suspended)
- International Agricultural Development, B.S.

Minors:

- Contemporary Leadership
- International Agricultural Development
- Science and Society

Non-degree programs:

- Undeclared/Exploratory
- Science and Society

COLLEGE OF BIOLOGICAL SCIENCES

Dean's Office
202 Life Sciences
(530) 752-0410; *http://biosci.ucdavis.edu/*

The College of Biological Sciences administers undergraduate programs in fundamental aspects of biology. The college is organized into five departments that represent major themes of modern biology: Evolution and Ecology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology. The individual departments offer a total of eight specialized majors, each focusing on one of the core disciplines of biology. The Biological Sciences major, the Individual major, the Undeclared-Life Sciences program and the Bodega Marine Laboratory Spring Quarter Program are offered by the entire college.

The Undergraduate Programs

Biological Sciences

The Biological Sciences major is broad in concept, designed to span the numerous core disciplines of biology. The major covers most dimensions of the study of life, ranging from molecules and cells to populations of organisms. While emphasizing breadth, the Bachelor of Science degree also requires the student to select an area of emphasis that provides concentrated study in one facet of biology at the upper division level. Areas of emphasis are Evolution, Ecology and Biodiversity; Marine Biology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology.

Major:

- Biological Sciences, A.B., B.S.

Minor:

- Biological Sciences

Evolution and Ecology

The major in Evolution, Ecology and Biodiversity offers the student a broad background in the theoretical and empirical basis of our understanding of the evolution and ecology of living organisms. The program of study begins with a core of introductory courses in mathematics, physical sciences and biology. These are followed by survey courses in evolution and ecology and more specialized courses that focus the student on particular disciplines or organisms, with an emphasis on problem-solving and critical thinking.

Major:

- Evolution, Ecology and Biodiversity, A.B., B.S.

Minor:

- Evolution, Ecology and Biodiversity

Microbiology

Microbiology deals with bacteria, yeasts and other fungi, algae, protozoa and viruses. These microorganisms are ubiquitous in nature and play a crucial role in areas such as agriculture, biotechnology, ecology, medicine and veterinary science. The field of microbiology contributes to areas of fundamental inquiry such as biochemistry, cell biology, evolution, genetics, molecular biology, pathogenesis and physiology.

Major:

- Microbiology, A.B., B.S.

Molecular and Cellular Biology

The Department of Molecular and Cellular Biology offers three majors.

The Biochemistry and Molecular Biology major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically important molecules. Students who enjoy both chemistry and biology and who are comfortable with quantitative approaches to problem-solving will find this major a rewarding field of study.

The Cell Biology major provides a comprehensive understanding of the cell, the basic structural and functional unit of all living organisms. The major emphasizes the principles that govern how biomolecules interact with one another to organize themselves into higher order structures that comprise cells and how cellular organization and function contribute to the development, maintenance and reproduction of adult organisms.

The Genetics major provides a broad background in the biological, mathematical and physical sciences basic to the study of heredity and evolution. The major provides a dual focus on the molecular mechanisms that regulate utilization of information encoded within the genome as well as the mechanisms and analysis of inheritance of genetic information. The major is sufficiently flexible to accommodate students interested in the subject either as a

basic discipline in the biological sciences or in terms of its applied aspects in medicine, biotechnology and agriculture.

Majors:

- Biochemistry and Molecular Biology, B.S.
- Cell Biology, B.S.
- Genetics, B.S.

Neurobiology, Physiology, and Behavior

The Department of Neurobiology, Physiology, and Behavior offers two majors.

The major in Exercise Biology is an integrative program of study, encompassing the physiological, biomechanical and behavioral aspects of exercise and physical activity. The focus is on both the acute and adaptive effects of physical activity (and inactivity). Exercise biology deals with the mechanisms and consequences of activity from the molecular to the organismal (human ecological) level. We examine these mechanisms and consequences during growth, development, aging, disease and in altered environmental conditions. The exercise biology major encompasses the critical aspects of an integrative program in applied human biology.

The Neurobiology, Physiology, and Behavior major emphasizes the understanding of vital functions common to all animals. All animals perform certain basic functions-they grow, reproduce, move, respond to stimuli and maintain homeostasis. The physiological mechanisms upon which these functions depend are precisely regulated and highly integrated. Actions of the nervous and endocrine systems determine behavior and the interaction between organisms and their physical and social environments. Students in this major will study functional mechanisms; the control, regulation and integration of these mechanisms; and the behavior which relates to those mechanisms at the level of the cell, the organ system and the organism.

Major:

- Exercise Biology, A.B., B.S.
- Neurobiology, Physiology, and Behavior, B.S.

Minor:

- Exercise Biology
- Human Physiology
- Neuroscience

Plant Biology

Plant Biology is the study of plants as organisms. It includes the newer disciplines of cellular and molecular plant biology and the traditional areas of botany, such as anatomy, morphology, systematics, physiology, mycology, phycology, ecology and evolution. The major provides breadth in diverse areas of plant biology and depth in one of several areas of specialization.

Major:

- Plant Biology, A.B., B.S.

Minor:

- Plant Biology

Collegewide Programs

Quantitative Biology and Bioinformatics

The interdisciplinary minor in Quantitative Biology and Bioinformatics is an integrative program that introduces students to the quantitative and computational approaches that are redefining all disciplines in the biological sciences, from molecular and cell biology, through genetics and physiology, to ecology and evolutionary biology. The minor in Quantitative Biology and Bioinformatics is open to all undergraduates regardless of major and is sponsored by the College of Biological Sciences.

Minor:

- Quantitative Biology and Bioinformatics

Individual Major

Students whose academic interests are not met by any established major, or combinations of majors and minors may develop an Individual major. Students work in conjunction with the Committee on Undergraduate Petitions and a faculty member in the college.

Major:

- Individual Major, A.B., B.S.

Students who wish to explore the array of life science majors offered at UC Davis before declaring a major may be admitted to the college through the Undeclared—Life Sciences program. These students use the College of Biological Sciences Dean's Office for their advising center. Students in this program must declare a major before completing 90 units.

Bodega Marine Laboratory Program

http://bml.ucdavis.edu/

Spring Quarter Program

A full quarter of undergraduate course work in marine biology is available each spring quarter at the Bodega Marine Laboratory, located in Bodega Bay, California. Course offerings include lecture and laboratory instruction in the developmental biology and physiological adaptation of marine organisms, and population biology and ecology; a weekly colloquium; and an intensive individual research experience under the direction of laboratory faculty (Biological Sciences courses 120, 120P, 122, 122P, 123; Neurobiology, Physiology, and Behavior 141, 141P). This is a 15 unit program and course offerings and instructors may vary from year to year. Applications are due January 31. For more course detail, see Bodega Marine Laboratory Program, on page 182 or *http://bml.ucdavis.edu/*.

Summer Special Session Courses

This integrated program offers students a multidisciplinary understanding of coastal ecosystems through intensive, hands on courses taught at Bodega Marine Laboratory. The program offers students three sequences of instruction with up to 10 units in each. Two sequences occur during the first Summer Session dates and one sequence in the second Summer Session dates. Applications are due April 15. For more course detail, see full description under appropriate academic department listing or *http://bml.ucdavis.edu/*.

The programs are residential with students housed on the laboratory grounds. Participants are assessed a room and board fee in addition to standard campus registration fees. Additional information is available directly from the Bodega Marine Laboratory at (707) 875-2002, P.O. Box 247, Bodega Bay, CA 94923.

COLLEGE OF ENGINEERING

Undergraduate Advising Office
1050 Kemper Hall
(530) 752-1979; *http://engineering.ucdavis.edu*
Facebook: UC Davis College of Engineering

Engineering is the profession in which the physical and biological sciences are applied in a practical way for the benefit of society. As an engineering student, you will learn to observe and describe technological problems and to seek useful solutions to them. Your skills upon graduation will be useful to you not only as an engineer, but also as a professional in management, sales, operations, manufacturing and other fields.

Sixteen undergraduate majors, including two combined major programs are offered. Each of these is a four-year program leading to the degree of Bachelor of Science.

The Engineering Accreditation Commission of ABET (111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700) accredits the following programs:

- Biochemical Engineering
- Biological Systems Engineering
- Chemical Engineering
- Civil Engineering
- Computer Engineering
- Electrical Engineering
- Electronic Materials Engineering
- Materials Science and Engineering
- Mechanical Engineering
- Optical Science and Engineering
-

The Engineering Accreditation Commission and the Computing Accreditation Commission of ABET (111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700) accredit the following program:

- Computer Science and Engineering

The following programs are not accredited by The Engineering Accreditation Commission of ABET (111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700):

- Aerospace Science and Engineering
- Biomedical Engineering
- Computational Applied Science
- Chemical Engineering/Materials Science and Engineering
- Mechanical Engineering/Materials Science and Engineering

Minor Programs. The College of Engineering currently offers four minor programs:

- Construction Management and Engineering; in the Department of Civil and Environmental Engineering
- Energy Science and Technology; in the Department of Biological and Agricultural Engineering
- Energy Policy; in the Department of Biological and Agricultural Engineering
- Optical Science and Engineering; in the Department of Applied Science

In addition, the Department of Computer Science offers a minor in Computer Science

The Undergraduate Programs

Applied Science

The Department of Applied Science offers two majors, one in Optical Science and Engineering and one in Computational Applied Science. The objective of the Optical Science and Engineering program is to provide a basic education in the fundamental principles of optics combined with key courses in physics, mathematics and the engineering applications of optics. There is a rapidly growing national demand for engineers educated in optical science and engineering. Much of the high-technology infrastructure is based upon optics and its applications, the most prominent being optical digital information transmission. In addition, engineers trained in optical science and engineering are in strong demand in health care and life science, optical sensing for environmental and weather applications, energy-use reduction, commercial camera and space-program optical applications, and national defense applications. Computational Applied Science deals with the interplay between the mathematics of models that arise from physical science and engineering and the numerical techniques for their computational implementation and subsequent solution. The major provides a comprehensive background in mathematics and physical science. The specific objective of the major is to enable students to construct practical numerical solutions to problems in science and engineering. Strong components of the program are the development, analysis and integration of numerical algorithms and an appreciation for the interaction among numerical simulations, theoretical models and experiments.

Majors:

- Computational Applied Science, B.S.; not currently open for admission
- Optical Science and Engineering, B.S.

Minors:

- Optical Science

Biological and Agricultural Engineering

Biological Systems Engineering majors learn to combine the science and art of engineering with the science of biology to design systems that influence, control, or use biological materials and organisms for improving the quality of life. Specific objectives include designing systems to process biological materials into consumer products; designing machines to interact with biological systems in disciplines ranging from agriculture to medicine; managing, recycling and using wastes; developing systems to protect and preserve our natural resources and environment; developing and improving processing systems for food; designing equipment and systems that improve nutrition and diets; and minimizing waste discharge to the environment.

Majors:

- Biological Systems Engineering, B.S.

Minors:

- Energy Science and Technology
- Energy Policy

Biomedical Engineering

The Department of Biomedical Engineering advances fundamental medical concepts; creates knowledge from the molecular to the organ systems levels; and develops innovative biologics, materials, processes, implants, devices and informatics approaches. These approaches are applied to the prevention, diagnosis and treatment of disease. The objective is to prepare students for employment in companies that manufacture medical assist devices, human tissue products and therapeutics. The program also prepares students to enter a graduate program in biomedical engineering or pursue professional degrees in medicine and related health fields.

Majors:

- Biomedical Engineering, B.S.

Chemical Engineering and Materials Science

The Department of Chemical Engineering and Materials Science offers five majors, including two combined majors.

Chemical Engineering majors learn to apply chemical and engineering principles to create useful products ranging from antibiotics to zirconium, from petroleum to plutonium, from agricultural chemicals to plastics. Specific objectives include the design of industrial processes as diverse as integrated circuit materials production, integrated waste management and petroleum refining.

Biochemical Engineering majors combine chemical engineering studies with studies in the life sciences and bioprocess engineering. Bioprocess engineering is the application of engineering principles to develop, optimize and commercialize manufacturing processes. Specific objectives include pharmaceuticals production, environmental repair, industrial chemical production and food production.

Materials Science and Engineering majors learn to understand the relationships among microscopic structure, properties and behavior of materials in order to produce new and improved materials with capabilities far superior to common metals, alloys and ceramics. Specific objectives include the development of materials for high-speed transportation systems, surgical and dental implants, new generations of power plants and solid-state electronic devices in computer and optical communications technology.

Majors:

- Biochemical Engineering, B.S.
- Chemical Engineering, B.S.
- Chemical Engineering/Materials Science and Engineering, B.S.
- Materials Science and Engineering, B.S.
- Electronic Materials Engineering B.S.

Civil and Environmental Engineering

Civil Engineering majors learn to apply the principles of the physical and biological sciences and engineering to plan and design systems to improve the quality of life. Specific objectives include providing potable water and freedom from disease-carrying wastes; protecting the natural environment; mitigating the effects of earthquakes and other natural disasters; designing land-, water- and air-transportation systems; and building roads and structures.

Majors:

- Civil Engineering, B.S.

Minors:

- Construction Engineering and Management

Computer Science and Engineering

The field of computer science and engineering encompasses the organization, design, analysis, theory, programming and application of digital computers and computing systems. The curriculum develops versatile engineers with backgrounds spanning a broad computer/software spectrum. The Computer Science and Engineering major provides a solid background in mathematics, physics, chemistry and electronic circuits and systems—all supporting the computer hardware and software courses that form the focus of the curriculum. A key theme is the hardware/software interaction in computer system design; this theme is reflected in the balance between hardware and software course requirements and in the orientation of the courses themselves. The major requires more humanities and social science electives than other college majors, in order to produce the verbal skills and intellectual breadth demanded by today's employers.

Major:

- Computer Science and Engineering, B.S.

Electrical and Computer Engineering

Electrical Engineering majors learn to apply the principles of the physical sciences and engineering to the design, analysis, development, production and evaluation of electronic systems. Specific objectives include the provision of systems for communications, control, signal processing, integrated circuit fabrication, optoelectronics, consumer electronics and digital systems.

Computer Engineering majors study the design, development, analysis, organization, theory, programming and application of digital computers. Specific objectives include developing the student's ability to design both software and hardware. In comparison to the Computer Science and Engineering major, the Computer Engineering major provides greater emphasis on hardware in the key hardware/software interaction in computer system design.

Majors:

- Computer Engineering, B.S.
- Electrical Engineering, B.S.

Mechanical and Aerospace Science Engineering

Aerospace Science and Engineering majors learn to apply the principles of the physical sciences and engineering to vehicles whose motion is determined by aerodynamic forces. Specific objectives include the design, development and manufacture of aircraft and other transportation systems integrating the disciplines associated with aerodynamics, propulsion, structures and guidance/control.

Mechanical Engineering majors learn to apply physical and mechanical principles to the design and manufacture of machines and products, energy conversion systems and equipment for guidance and control. Specific objectives include the provision of products and processes for intelligent manufacturing systems, biomechanical and sports equipment, power generation systems, propulsion for transportation, integration of vehicles and automated highways, and applications of computer and automation technologies.

Majors:

- Aerospace Science and Engineering, B.S.
- Mechanical Engineering, B.S.
- Mechanical Engineering/Materials Science and Engineering, B.S.

COLLEGE OF LETTERS AND SCIENCE

Office of Undergraduate Education
and Advising
Room 200, Social Sciences
and Humanities Building
(530) 752-0392; *http://www.ls.ucdavis.edu*

Major programs in the College of Letters and Science provide students systematic exposure to the key principles, methods, findings and representations of a selected area of study. In pursuing a major, students gain intellectual depth and competency in that subject matter, explore important linkages with collateral fields of inquiry and are encouraged to engage in independent study.

The academic programs offered through the college are grouped in three divisions: Humanities, Arts and Cultural Studies; Mathematical and Physical Sciences; and Social Sciences. One collegewide degree program, the individual major, also is available.

The Undergraduate Programs

Division of Humanities, Arts and Cultural Studies

These majors focus centrally on the artifacts, expressions and concerns of humankind in various cultures and times. They provide students the opportunity to explore the creation, performance and analysis of works of art, the language and customs of non-English speaking societies, the theory and criticism of literature, and the peoples and cultures of this nation and its hemisphere. Students interested in studying these types of issues may select from more than 20 different majors.

Majors:

- African American and African Studies, A.B.
- American Studies, A.B.
- Art History, A.B.
- Art Studio, A.B.
- Asian American Studies, A.B.
- Chicana/Chicano Studies, A.B.
- Chinese, A.B.
- Classical Civilization, A.B.
- Comparative Literature, A.B.
- Design, A.B.
- Dramatic Art, A.B.
- English, A.B.
- Film Studies, A.B.
- French, A.B.
- German, A.B.
- Italian, A.B.
- Japanese, A.B.
- Medieval and Early Modern Studies, A.B.
- Music, A.B.
- Native American Studies, A.B.
- Religious Studies, A.B.
- Russian, A.B.
- Spanish, A.B.
- Technocultural Studies, A.B.
- Women's Studies, A.B.

Minors:

- African American and African Studies
- American Studies
- Art History
- Art Studio
- Asian American Studies
- Chicana/Chicano Studies
- Chinese
- Classical Civilization
- Comparative Literature
- Dramatic Art
- English
- Expository Writing
- Film Studies
- French
- German
- Global and International Studies
- Greek
- Italian
- Japanese
- Latin
- Medieval and Early Modern Studies
- Music
- Native American Studies
- Religious Studies
- Russian
- Sexuality Studies
- Social and Ethnic Relations
- Spanish
- Women's Studies

Division of Mathematical and Physical Sciences

These majors focus primarily on the description and interpretation of the structure, processes and events of the physical universe. They provide students the opportunity to explore in depth the structure, properties and reactions of substances; fundamental mathematical techniques and models and their application to the interpretation and explanation of phenomena; studies of matter and energy and their interconversions; the nature and development of computer languages; and earth and environmental processes. Students interested in studying these types of subjects may select from ten different majors. The division strongly encourages undergraduates to enroll in undergraduate research projects with one-on-one instruction by faculty scholar/researchers.

Majors:

- Applied Mathematics, B.S.
- Applied Physics, B.S.
- Chemistry, A.B., B.S.
- Computer Science, B.S.
- Geology, A.B., B.S.
- Mathematical and Scientific Computation, B.S.
- Mathematics, A.B., B.S.
- Natural Sciences, B.S.

- Physics, A.B., B.S.
- Statistics, A.B., B.S.

Minors:

- Chemistry
- Computer Science
- Environmental Geology
- Geology
- Geophysics
- Mathematics
- Oceanography
- Physics
- Statistics

Division of Social Sciences

These majors focus largely on issues and problems that characterize social, cultural, political and economic life across human societies. They provide students the opportunity to explore the relationships between people and the groups and organizations of which they are a part, the antecedents of individual behavior, the development of political and economic systems, the social forces that have shaped the contemporary world and the foundations of language, thought, knowledge and perception. Students interested in studying these types of issues may select from more than a dozen different majors.

Majors:

- Anthropology, A.B., B.S.
- Communication, A.B.
- East Asian Studies, A.B.
- Economics, A.B.
- History, A.B.
- International Relations, A.B.
- Linguistics, A.B.
- Middle East/South Asia Studies, A.B.
- Philosophy, A.B.
- Political Science, A.B.
- Political Science–Public Service, A.B.
- Psychology, A.B., B.S.
- Science and Technology Studies, A.B.
- Sociology, A.B.
- Sociology–Organizational Studies, A.B.

Minors:

- Anthropology
- Communication
- East Asian Studies
- Economics
- History
- History and Philosophy of Science
- Jewish Studies
- Latin American and Hemispheric Studies
- Linguistics
- Linguistics for Language Teachers
- Middle East/South Asia Studies
- Philosophy
- Political Science
- Psychology
- Sociology
- War-Peace Studies

Collegewide Program

Students whose academic interests cannot be satisfactorily met through the completion of an established major have the opportunity to develop an individual major. Individual majors may reflect the most recent trends in scholarship and research and are typically interdisciplinary in nature. The major proposal is developed in close and active consultation with two faculty advisers from the academic disciplines most closely related to the subject matter of the individual major. Careful faculty guidance and review assure that individual majors are comparable in academic rigor and intellectual coherence to those regularly available through the departments and programs of the college.

Major:

Individual Major, A.B., B.S.

BACHELOR'S DEGREE REQUIREMENTS

You must satisfy four groups of requirements before you can become eligible for candidacy for the bachelor's degree; see Bachelor's Degree Requirements, below. The four groups are:

- University requirements, which apply to all colleges;
- General Education requirement, which applies to all colleges;
- College requirements; and
- Major requirements.

Every student is responsible for seeing that all of their degree requirements are fulfilled.

Detailed information on university requirements, the General Education requirement and college requirements can be found in this chapter.

UNIVERSITY REQUIREMENTS

All students must fulfill the following University of California requirements.

Entry Level Writing (Subject A) Requirement

The university requires every undergraduate student to demonstrate college-level proficiency in English composition. Satisfaction of the Entry Level Writing Requirement is a prerequisite to all other undergraduate courses in English.

The requirement, as determined by Undergraduate Admissions, may be met in one of the following ways:

- By earning a score of 680 or higher on the Writing section of the new SAT Reasoning Examination, or on the old SAT-II Writing Test.
- By earning a score of 3, 4 or 5 on either College Board Advanced Placement Examination in English.
- By earning a score of 30 or higher on the Combined English/Writing section of the ACT Assessment.
- By earning a score of 5 or above on the International Baccalaureate's Higher Level English A Examination.
- By earning a score of 6 or above on the International Baccalaureate's Standard Level English A Examination
- By entering the university with credentials showing the completion of an acceptable 3 semester-unit or 4 quarter-unit college-level course in English composition with a grade of C or higher.
- By writing a passing essay on the Analytical Writing Placement Examination. This examination may be taken only once prior to enrollment. It is offered in the spring at local sites throughout California; a student admitted for fall quarter who has not already satisfied the Entry Level Writing Requirement must take this examination. Out-of-state students or any California freshmen admitted after mid-April will take another form of the Analytical Writing Placement Examination, which will be offered on the UC Davis campus at the beginning of each quarter. For the time and location, consult the *Class Schedule and Registration Guide (CSRG)*, published before the beginning of each quarter.

If you have not satisfied the requirement in one of the ways described above, *you must enroll in Workload 57 during your first quarter of residence at the university, or as soon thereafter as space is available in the course*. Workload 57, offered by Sacramento City College on the UC Davis campus, counts as 4.5 units on your study list and toward minimum progress but carries no units toward graduation. To satisfy the requirement, students must earn a course grade of *C* or higher. Students who receive a grade lower than *C* must repeat Workload 57. If the requirement has not been satisfied by the end

Bachelor's Degree Requirements

University Requirements

All students must fulfill the following University of California requirements:

Entry Level Writing (Subject A) Requirement

American History and Institutions Requirement

Unit Requirement

Residence Requirement

Scholarship Requirement

General Education Requirement

Students must complete three courses in the two areas of *topical breadth* outside the assigned area of their major. Students also must complete three *writing experience* courses and one *social-cultural diversity* course.

College Requirements

College of Agricultural and Environmental Sciences	College of Biological Sciences	College of Engineering	College of Letters and Science
Unit	Unit	Unit	Unit
Residence	Residence	Residence	Residence
Scholarship	Scholarship	Scholarship	Scholarship
English Composition	English Composition	English Composition	English Composition
	Foreign Language (only A.B. & B.A.S. degrees)	Design	Area (Breadth)
	Breadth (only A.B. & B.A.S. degrees)	Engineering General Education	Foreign Language (A.B. & B.A.S. degrees)
		Current Catalog Curriculum	

Major Requirements

Course requirements for each major are listed in the Programs and Courses section of this catalog.

of your third quarter, and you were not required to take courses for non-native speakers of English in the Linguistics program, you may be disenrolled from the University.

Students whose native or school language is not English, and some students whose schooling combines work in the United States and in another country, must demonstrate proficiency in English. The level of proficiency must meet the standards of both the Linguistics and the Entry Level Writing programs. The results of the Analytical Writing Placement Examination administered at the beginning of each quarter determine whether a student has met the Entry Level Writing Requirement or must take specific course work in the Linguistics program. Students held for Linguistics course work have three quarters to meet the Entry Level Writing Requirement plus the number of quarters required in Linguistics.

American History and Institutions

The American History and Institutions requirement ensures that every graduating student will have at least a minimum knowledge of the background of this country's development and an understanding of the political, economic and social interrelationships of its way of life.

You may meet this requirement in any of these ways:

- Complete one high school unit in American history, or 1/2 high school unit in American history and 1/2 high school unit in civics or American government, with a grade of *C* or better in each course
- Complete any one of the following courses:

  African American and African Studies 10, 100, 120, 121
  Asian American Studies 1, 2
  Economics 111A, 111B
  History 17A, 17B, 17C, 72A, 72B, 170A, 170B, 170C, 171A, 171B, 174A, 174B, 174C, 175A, 175B, 175C, 176A, 176B, 177A, 177B, 179, 180A, 180B, 183A, 183B (upper division courses may be taken only with the consent of the instructor)
  Native American Studies 1, 10, 55, 116, 130A, 130B, 130C
  Political Science 1, 5, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163

  Students electing to complete one of the above courses in order to meet this requirement are subject to the rules for prerequisites and majors
- Present evidence that the requirement has been accepted as satisfied at another campus of the university
- Present evidence that the requirement has been satisfied through courses in the area of American History and Institutions at another collegiate institution whose credits are acceptable for transfer to UC Davis
- Successful completion of the Advanced Placement (AP) Examination in American History or American Government and Politics with a score of 3 or higher
- Successful completion of the International Baccalaureate (IB) Examination in History of the Americas Higher Level (HL) with a score of 5, 6, or 7
- Successful completion of the SAT Subject Examination in U.S. History with a score of 550 or higher

International students, regardless of the type of visa they hold, must meet the university's American History and Institutions requirement for graduation.

Unit Requirements

A minimum of 180 quarter units is required for graduation. These must be distributed according to the minimum requirements set forth by the faculty of your college.

A maximum of 12 units of Internship Courses (92, 192, or a combination) may be counted toward the 180-unit bachelor's degree requirement.

The acceptability of transfer courses for unit credit is determined by Undergraduate Admissions. The acceptability of such courses toward specific requirements is determined by the individual college or school.

Students should refer to the Advanced Placement Examination chart and their transcripts to eliminate the possibility of duplication of credit.

Residence Requirements

The minimum residence requirement for a bachelor's degree at the University of California is one academic year (three quarters). Thirty-five of the final 45 quarter units completed by each candidate must be earned while in residence on the UC Davis campus. Each summer session in which a student completes a course of at least 2 quarter units may be counted as half a quarter's residence. Not more than 18 of these 35 quarter units may be completed in summer session courses at UC Davis.

Regularly approved courses (laboratory, field, or other individual work) done outside of a regular session but under the direction of a department of instruction may be accepted upon the recommendation of the department in partial fulfillment of the residence requirement for the bachelor's degree. Registration is with the consent of the instructor only.

UC Davis Extension courses are not accepted as part of the university residence requirement.

There are additional residence requirements for students enrolled in the Colleges of Letters and Science and Engineering. If you are planning to study abroad during your senior year, you should consult your college dean's office.

With the approval of the dean of a student's college or school, a candidate for the bachelor's degree who was in active service in the armed forces of the United States in the year preceding the awarding of the degree may be recommended for the degree after only one quarter of university residence in which the candidate completes at least 16 units or passes a comprehensive examination in the major or field of concentration.

Scholarship Requirement

To receive a bachelor's degree, you must obtain twice as many grade points as units (a 2.000 GPA) for all courses you have attempted in the university. An exception to this rule is made for those students undertaking certain honors courses. For specific college requirements consult the college sections following.

GENERAL EDUCATION REQUIREMENT

The General Education (GE) requirement promotes the intellectual growth of all undergraduates by ensuring that they acquire a breadth of knowledge that will enlarge their perspectives beyond the focus of a major and serve them well as participants in a knowledge-based society. It seeks to stimulate continued intellectual growth by providing students with knowledge not only of the content but also of the methodologies of different academic disciplines. It involves students in the learning process by its expectation of considerable writing and class participation. It encourages students to consider the relationships between disciplines.

The following section pertains to students who matriculated to UC Davis prior to Fall 2011. Students who matriculate for the first time in Fall 2011 or later should refer to the Revised General Education (GE) Requirement*, on page 96**.**

The GE requirement has three components: **Topical Breadth**, **Social-Cultural Diversity** and **Writing Experience**.

Topical Breadth

A GE course in topical breadth addresses broad subject areas that are important to the student's general knowledge. It takes a critical, analytical perspective on knowledge, considering how knowledge has been acquired and the assumptions, theories, or paradigms that guide its use.

Topical breadth courses are grouped into three broad subject areas of knowledge:

1. **Arts and Humanities.** Courses in this area provide students with knowledge of significant intellectual traditions, cultural achievements and historical processes.
2. **Science and Engineering.** Courses in this area provide students with knowledge of major scientific ideas and applications. They seek to communicate the scope, power, limitations and appeal of science.
3. **Social Sciences.** Courses in this area provide students with knowledge of the individual, social, political and economic activities of people.

Social-Cultural Diversity

Courses in social-cultural diversity teach students the significance of the many patterned differences that characterize human populations—particularly differences of gender, race, ethnicity, sexuality, religion or social class.

Writing Experience

Courses in writing experience improve student writing through instruction and practice. Writing assignments are designed to encourage students to think critically and communicate effectively. Courses require one extended writing assignment (five pages or more) or multiple short assignments. Writing is evaluated not only for content, but also for organization, style, use of language, and logical coherence.

Fulfilling the General Education Requirement

Topical Breadth Component: 6 courses

To fulfill the topical breadth component of the General Education requirement you must successfully complete three approved courses in each of the two subject areas of topical breadth other than the one that includes your major. To identify the area of topical breadth to which your major belongs, refer to the chart at the back of this catalog. Each academic major has been assigned to one of the three subject areas of GE topical breadth. If you have any questions concerning the subject area to which your major is assigned, consult your college dean's office.

Fulfilling the General Education Requirement

Freshman student, or Transfer student* who has not completed TCC or IGETC†

6 GE courses in topical breadth—3 courses in each of the two subject areas other than your major's assigned area
1 GE course in social-cultural diversity
3 GE courses in writing experience

Bear in mind that some courses may count toward two or three components of GE. For example, a single course might provide GE credit for *topical breadth, writing experience* and *social-cultural diversity.* Depending on the GE courses you choose, you can satisfy the GE requirement with 6 courses.

* Transfer work comparable to approved UC Davis GE courses may be used to satisfy the GE requirement, as determined by the college dean's office.

Transfer student who has successfully completed TCC or IGETC†

GE requirement satisfied; no further GE courses required

† Transfer Core Curriculum (TCC) or Intersegmental General Education Transfer Curriculum (IGETC); completion must be certified by the community college. College of Engineering students still have General Education requirements to complete.

- **Double majors** will satisfy the topical breadth subject areas to which they are assigned. You will still be responsible for completing any topical breadth subject area in which you do not have a major. If, for example, two majors are assigned to the same subject area, you will need to complete the topical breadth component in each of the other two other subject areas. If, on the other hand, you complete two majors that have been assigned to two different areas of topical breadth then you will be responsible for completing the topical breadth component in only the remaining subject area.
- **Individual majors** are assigned to an area of topical breadth at the time they are approved by your college.
- **Each minor** has also been assigned to one of the three subject areas of topical breadth. A minor assigned to a subject area other than the area of your major will satisfy the GE course requirement for topical breadth in that subject area.
- **Courses in your major** may count toward the topical breadth component when those courses are also assigned to subject areas other than the area of your major.
- **A course approved in more than one topical breadth subject area** may only be offered in satisfaction of **one** of those subject areas.

Social-Cultural Diversity Component: 1 course

To fulfill the social-cultural diversity component of the GE requirement, you must successfully complete one course from the approved list at the back of this catalog.

Writing Experience Component: 3 courses

To fulfill the writing experience component of the GE requirement, you must successfully complete three courses from the approved list at the back of this catalog.

- **Entry Level Writing Requirement (formerly Subject A).** You must satisfy the university Entry Level Writing Requirement before you take any writing experience course for GE credit. If you take an approved writing experience course, but have not yet satisfied the Entry Level Writing Requirement, you **will not** receive GE writing experience credit for that course.

Additional Conditions

- **Letter grading.** All courses taken to fulfill the GE requirement must be taken for a letter grade. No GE credit will be awarded for a course that you take on a Passed/Not Passed basis.
- **College and university composition requirements.** The following GE courses may not be used to satisfy university or college requirements in composition and GE writing experience simultaneously:
  - Communication 1
  - Comparative Literature 1, 2, 3, 4
  - English 3
  - Evolution and Ecology 12
  - Native American Studies 5
  - University Writing Program 1, 18, 19, 101, 102 series, and 104 series

  Remember: You must satisfy the university Entry Level Writing Requirement before you take any writing experience course for GE credit.
- **Courses approved for multiple GE components.** Courses approved for more than one component of the GE requirement (topical breadth, writing experience and social-cultural diversity) will be accepted toward satisfaction of all components for which the course has been approved.
- **Approved GE courses.** You cannot claim GE credit for any course you completed before it was an approved GE course.

College of Engineering. Students seeking a degree in a College of Engineering major must complete 24 units of general education coursework (33 units are required for Computer Science and Engineering majors) and two upper division courses from the campus approved list of approved courses in Arts and Humanities or Social Science. The list of approved courses appears at the back of this catalog.

GE Exemption

IGETC, TCC and UC Reciprocity. You are exempt from the UC Davis GE requirement if you come from a California community college and are certified as having successfully completed the "Intersegmental General Education Transfer Curriculum" (IGETC) or "Transfer Core Curriculum" (TCC), or if you come from another UC campus and are certified as having successfully completed the lower division breadth or General Education requirements of that UC campus (UC reciprocity).

If you are in the College of Engineering and have satisfied IGETC or TCC, you are still required to complete two upper-division General Education courses at UC Davis to satisfy College of Engineering requirements.

Approved General Education Courses

See General Education Courses/Options, on page 539, for a list of the courses that provide General Education credit for 2010-11. Please note that you cannot claim GE credit for a course you completed before it was an approved GE course. This list is subject to change. For the most current information, you should check the *Class Schedule and Registration Guide (CSRG)* each quarter.

Revised General Education (GE) Requirement*

Effective Fall 2011; *Abridged summary—full description will be published in the Fall 2011 General Catalog Supplement.

The revised GE requirement has two components, **Topical Breadth** and **Core Literacies**, and is defined in terms of units, not courses. The units of most undergraduate courses at UC Davis are assigned to one of the three **Topical Breadth Areas**. Additionally, the revised GE requirement integrates training in **Core Literacies** into topical breadth. The literacies are crucial both for success in one's profession and also for the a thoughtful engaged citizenship in the community, nation and world. With the exception of units used to satisfy the English Composition element, units approved for a **Core Literacy** will be accepted toward satisfaction of the appropriate **Topical Breadth** component. However, units may be counted toward satisfaction of only one Core Literacy.

Students may take courses *P/NP* to fulfill their GE requirements, up to the limits set by college and campus regulations. Students may not present Advanced Placement or International Baccalaureate credit in satisfaction of GE requirements.

Transfer students who have successfully completed the Intersegmental General Education Transfer Curriculum (IGETC) are exempt from all General Education requirements. Transfer students who have not completed the IGETC are required to satisfy all General Education components under the revised requirement but may offer previously completed coursework toward their satisfaction.

The requisite units for both components of the revised General Education requirements is summarized below, however, a full description of each of the Core Literacies can be found at *http://ge.ucdavis.edu/local_resources/docs/GE-requirement-June08-final.pdf*.

A. Topical Breadth Component . . . . . 52 units

- **Arts and Humanities** . . . . . 12-20 units
- **Science and Engineering** . . . . . 12-20 units
- **Social Sciences** . . . . . 12-20 units
  Note: In the case of a course that has been certified in more than one Topical Breadth Area, a student may count the units of the course in only one of the areas in which it has been certified.

B. Core Literacies Component . . . . . 35 units

1. Literacy with Words and Images . . . . . at least 20 units

a. English Composition . . . . . 8 units
(as described by College of A&ES, College of L&S, College of Biological Sciences, or College of Engineering)

b. Writing experience coursework in the student's major or elsewhere . . . . . at least 6 units

c. Oral skills coursework or additional writing experience coursework . . . . . at least 3 units

d. Visual literacy coursework. . . . . at least 3 units
Note: A student must have completed the Entry Level Writing Requirement (formerly known as the Subject A requirement) before receiving GE credit for coursework satisfying requirements **a**, **b**, and **c** above).

2. Civic and Cultural Literacy. . . . . at least 9 units

a. American Cultures, Governance, and History. . . . . .at least 6 units; of which at least 3 units must be in a course certified as focusing on issues of domestic diversity

b. World Cultures . . . . . at least 3 units

3. Quantitative Literacy. . . . . at least 3 units

4. Scientific Literacy. . . . . at least 3 units

General Education Theme Options

The following section pertains to students who matriculated to UC Davis prior to Fall 2011. Students who matriculate for the first time in Fall 2011 or later should refer to the Revised General Education (GE) Requirement*, on page 96.

General Education theme options are sets of GE courses sharing a common intellectual theme. Faculty from the College of Agricultural and Environmental Sciences have worked collaboratively to develop sets of complementary courses in several areas of interest. These GE theme options are not a separate element of the GE requirement, but a way of selecting your GE courses so that you may benefit from a coherent focus of study while completing the GE requirement.

Completion of a theme satisfies the GE requirement for students with majors assigned to the GE topical breadth area of Arts and Humanities. Students with majors assigned to the topical breadth area of either Science and Engineering or Social Science will need to complete additional GE courses in Arts and Humanities to satisfy the campus GE requirement.

Beginning a theme option does not prevent you from later choosing to take other approved GE courses to fulfill the GE requirement. If you choose to mix courses from a theme option and the broader GE course lists, you will need to make sure that the combination of courses you select will complete the campus GE requirement.

COLLEGE REQUIREMENTS FOR THE BACHELOR'S DEGREE

College of Agricultural and Environmental Sciences

Unit Requirements

Of the required 180 units counted toward a degree, 54 units must be upper division work.

Unit Credit Limitations

In addition, the following unit limitations apply to all majors:

- Not more than 6 units can be Physical Education 1 and 6
- Not more than 20 units can be courses numbered 90X, 92, 97T, 97TC, 99, 190C, 190X, 192, 197T, 197TC, or 199
- Not more than 12 units can be courses numbered 92 and/or 192 (credit will not be given for 192s or 199s taken before the completion of 84 units)
- Not more than 5 units per quarter of Special Study courses (99, 194H, 199)
- Not more than 9 units of professional courses (numbers 300–499) may be used toward the 54 upper division units

Limitation on Credit for Units Graded P. The Academic Senate limits the total number of courses graded *P*, including units earned in courses graded "P/NP only," to one third of the units completed on the UC Davis campus. The *P/NP* option is to be used only for elective courses and should not be used for major requirements.

Credit for Open Campus (Concurrent) Courses. Students may apply credit for courses taken in the Open Campus (Concurrent) Program through UC Davis Extension towards the 180-unit undergraduate degree requirement. The grade points earned when enrolled in Open Campus courses will count toward the calculation of a student's UC GPA upon his/her admission or readmission to regular student status at UC Davis. Students registered at UC Davis may not enroll in Open Campus courses.

Credit for UC Davis Extension Courses. Registered UC Davis students who plan to use academic credit earned in a UC Davis Extension course other than Open Campus (Concurrent) towards their UC Davis degree must obtain prior written approval from their College before registering in the UC Davis Extension. Upon approval students may apply a limited number of credits towards the 180-unit undergraduate degree requirements. Courses completed in UC Davis Extension will not count toward the calculation of a student's UC GPA.

Registration Beyond the 225-Unit Limit. Students may not exceed 225 units; registration for enrollment when the limit has been reached may only be approved by the Dean. A petition to complete excess units may be picked up in the Dean's office or in your major department.

Residence Requirement

Thirty-five of the final 45 quarter units completed by each candidate must be earned while in residence on the UC Davis campus.

Scholarship Requirement

Students in the College are required to attain a minimum grade point average of 2.000 for all courses specified as depth subject matter in their major. Options, specializations and emphases may be included. Consult your master advisor. Only grades earned in courses taken at UC Davis are included in the grade point calculation. Each candidate must complete a program of study either as prescribed in (*a*) a major approved by the Undergraduate Majors and Courses Standing committee and printed in this catalog, or (*b*) an individual major approved by the Individual Major Standing committee.

English Composition Requirement

The English Composition requirement can be met in one of two ways:

1. Either two courses emphasizing written expression or one course emphasizing written expression and one course emphasizing oral expression, with a grade of *C-* (or *P*) or better. The

following UC Davis courses satisfy this requirement:

(*a*) one course must be selected from English 3, University Writing Program 1, 18, 19, 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 104A, 104B, 104C, 104D, 104E, 104F, or Nematology 150 (courses with primary emphasis in writing skills);

(*b*) one course selected from the courses not selected above, or from Communication 1, Comparative Literature 1, 2, 3, 4, or Native American Studies 5 (courses emphasizing either writing or speaking skills);

OR

2. By passing the English Composition Examination administered by the College of Letters and Science upon completion of 70 units of degree credit (the examination does not yield credit).

English Composition Examination. The no-fee, no-unit examination is typically offered on a Saturday in October, January and April; for specific dates see the Class Schedule and Registration Guide or see *http://writing.ucdavis.edu/compexam/*.

If students choose to take this challenge exam, they are strongly advised to do so in their junior year. Register for the English Composition Examination at *http://writing.ucddavis.edu/compexam/* from the Monday before the exam date until Friday at noon or until no spaces remain. The AWPE/Upper-Division Composition Examination form, available at the UC Davis Bookstore, is required. It is recommended that students with disabilities contact the Student Disability Center at (530) 752-3184 and the University Writing Program at (530) 752-0450 at least two weeks prior to the exam date to arrange accommodations. No examinations are given during the summer.

General Education

You should consult your Dean's Office or department adviser in advance to determine exactly how your General Education courses will apply toward your major.

You can choose one of four General Education theme options to help plan your GE courses. The themes, Global Population and Environmental Issues; Biodiversity and Cultural Diversity; Food and Fiber; and Changing Agriculture are described in more detail in General Education Theme Options, on page 550.

Study Plan Approval

A Study Plan provides for attainment of specific long-term goals and should allow for the acquisition of prerequisite knowledge for courses to be taken in subsequent quarters; the fulfillment of College and major requirements; a proper balance between the demands of the courses and your ability to master the subject matter; and meeting the minimum progress requirements; see Course Load, on page 72.

In conjunction with a faculty adviser and/or staff adviser, you must plan and prepare a program that specifies your goals and shows how the graduation requirements will be met. It is a regulation that a written "study plan" be filed with your faculty adviser or staff adviser by the end of the second quarter of the junior year (having completed not more than 120 units either in residence and/or by transfer).

You may be denied registration for future quarters if you do not comply with this regulation. However, filing this study plan does not preclude a change of major or program modifications.

Major Degree Certification

A Major Certification is completed during the quarter you plan to graduate. At that time, you and your faculty adviser and/or staff adviser check to see that all ***major* requirements have been completed. The Dean's Office completes the degree certification by verifying that all *college* and *university* requirements have been satisfied and will notify you with a copy of the Major Certification form.**

Degree Requirement Changes

On occasion, the faculty make changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is college policy that you may choose to fulfill the university, college and major requirements in effect at the time you were registered at UC Davis. If you have transferred to UC Davis from a community college, state college, or another university, you may follow the requirements as stated in any UC Davis *General Catalog* in effect ***either* during the three years immediately preceding your transfer to UC Davis or at the time you first registered at that institution, *whichever is most recent*. Once you have chosen the year of the *General Catalog* under which you wish to be governed, you must satisfy all of the university, college and major requirements specified in that catalog.**

College of Biological Sciences

All students in the College of Biological Sciences must satisfy the following college requirements in addition to satisfying the University Requirements, on page 93 and General Education Requirement, on page 95.

Unit Requirements

Total Units. Complete no less than 180 units incorporating the unit credit limitations listed below. No student may exceed 225 units in their academic career without approval of the Dean. Units earned in Advanced Placement and International Baccalaureate exams are not counted toward this 225-unit limit. Upon reaching 200 units, a student must submit a quarter-by-quarter graduation plan to the Dean's Office or a hold will be placed on his/her registration.

Upper Division Units. Complete 64 upper division units.

Unit Credit Limitations

- **Passed/Not Passed Units.** All courses used to satisfy major requirements must be taken on a letter-graded basis, unless courses are only offered on a Passed/Not Passed basis.

  The Academic Senate limits the total number of courses graded P, including units earned in courses graded "P/NP only," to one third of the units completed on the UC Davis campus.
- **Physical Education.** Maximum of 6 units of Physical Education 1, 6 and similar physical activity courses including transfer work.
- **Transfer work.** Maximum of 105 units of credit earned at two-year institutions (community college).
- **Graduate Courses.** Courses numbered 200-299 may not be applied toward the 64-unit upper division requirement.

- **Professional and teaching courses.** Maximum of 9 units in courses numbered 300-399 and 400-499. These units may not be applied toward the 64-unit upper division requirement.
- **Upper division standing.** Must complete 84 units before enrolling in 192, 194H and 199 to receive degree and upper division credit.
- **Special Study.** Not more than 5 units per quarter of Special Study courses (99, 194H, 199).
- **Nonstandard Courses.** Maximum of 20 units of nonstandard courses including transfer work.*

  Nonstandard courses are defined here as tutoring, internship, research, research conference, honors research and similar course activities. Some examples of these courses are, but are not limited to, courses numbered 90C, 92, 92C, 97T, 97TC, 99, 189, 190C, 191, 192, 192C, 193, 194H, 197T, 197TC, 199, etc. Courses numbered 98 or 198 are not included in this 20-unit limitation.

  There are additional unit credit limitations on tutoring and internship units.

  - **Tutoring.** Maximum of 3 tutoring units including but not limited to 97T, 197T, 97TC and 197TC.
  - **Internship.** A maximum of 6 internship units including but not limited to 92, 192, 92C, 192C.

  *Specific exceptions to these limits may be granted by the Committee on Undergraduate Petitions based on the uniqueness of the experiences and their concordance with the petitioner's educational objectives.

Credit for Open Campus (Concurrent) Courses. Students may apply credit for courses taken in the Open Campus (Concurrent) Program through UC Davis Extension towards the 180-unit undergraduate degree requirement. The grade points earned when enrolled in Open Campus courses will count toward the calculation of a student's UC GPA upon his/her admission or readmission to regular student status at UC Davis. Students registered at UC Davis may not enroll in Open Campus courses.

Residence Requirement

Meet university residence requirement. No additional college residence requirements.

Scholarship Requirement

Students must attain at least a 2.000 GPA for all courses required in their major. Students must also attain a 2.000 GPA in all Depth Subject Matter courses required in their major. Students who fail to maintain a 2.000 GPA in courses required for their major over two consecutive quarters may be required to withdraw from the major.

- **Repeating Courses.** Students may once repeat courses in which they received a grade of *D+* or less. To repeat a course more than once, students must petition the Dean for approval prior to enrolling in the course.
- **Passed/Not Passed Grading Option.** All courses used to satisfy major requirements must be taken on a letter-graded basis, unless courses are only offered on a Passed/Not Passed basis.

English Composition Requirement

The English Composition requirement may be satisfied in one of two ways:

1. Completing 8 units, to include 4 upper division units, in English composition courses with at least a *C-* or Passed grade from the following list: Comparative Literature 1, 2, 3, 4, English 3, Evolution and Ecology 12, Native American Studies 5, Nematology 150, University Writing Program 1, 18, 19, 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 102H, 102I, 102J, 102K, 102L, 104A, 104B, 104C, 104D, 104E, 104F, 104I.

OR

2. Passing the English Composition Examination, administered by the Entry Level Writing program, upon completion of 70 units of degree credit. This examination does not yield credit. Students interested in entering the health science field should check with the Health Sciences Advising Office or the Dean's Office before choosing this option.

English Composition Examination

The no-fee, no-unit examination is typically offered on a Saturday in October, January, and April; for specific dates see the *Class Schedule and Registration Guide* or see *http://writing.ucdavis.edu/compexam/*.

If students choose to take this challenge exam, they are strongly advised to do so in their junior year. Register for the English Composition Examination at *http://writing.ucdavis.edu/compexam/* from the Monday before the exam date until Friday at noon or until no spaces remain. The AWPE/Upper-Division Composition Examination form, available at the UC Davis Bookstore, is required. It is recommended that students with disabilities contact the Student Disability Center (530) 752-3184 and the University Writing Program (530) 752-0450 at least two weeks prior to the exam date to arrange accommodations. No examinations are given during the summer.

Additional Bachelor of Arts Requirements

Bachelor of Arts degrees are available in Biological Sciences; Evolution, Ecology and Biodiversity; Exercise Biology; Microbiology; and Plant Biology. These degrees offer students an opportunity to broaden their education while pursuing a rigorous life science major.

Candidates for the Bachelor of Arts degrees must complete two additional requirements.

1. Foreign Language. The requirement can be met in one of three ways:

- Complete with passing grades 15 quarter units of college level course work, or the equivalent thereof, in a single language.
- Attain a minimal score prescribed by the Committee on Undergraduate Curriculum and Educational Policy, in the College Entrance Examination Board Achievement Test in Foreign Language, which may be taken at any time during the student's high school career, or any other achievement test approved by the Committee on Undergraduate Curriculum and Educational Policy.
- Placement beyond the 15-unit level on a placement/proficiency examination offered by one of the foreign language departments of the University.

2. Breadth Requirements. Complete one of the following options:

- At least three upper division courses in a single program in the humanities or social sciences, which are not offered in satisfaction of major, college English composition or General Education requirements. Each course must be at least three units and may not include internship, research, tutoring, other non-standard courses or directed group study courses.
- At least three lower or upper division courses in the fine arts, which are not offered in satisfaction of major, college English composition or General Education requirements. Each course must be at least three units and may not include internship, research, tutoring, other non-standard courses or directed group study courses.
- A certified minor or an additional major in the humanities, social sciences, or fine arts from any UC Davis college or program. Minors and all majors must be completed before accumulating 225 total units.

Declaration of Major/Undeclared—Life Sciences

Students must declare a major by 90 units. A hold will be placed on a student's registration if he/she is still undeclared after completing 90 units.

All changes of major and college must be completed before the beginning of the student's quarter of graduation.

Students with Biological Sciences majors and students who are Undeclared—Life Sciences use the College of Biological Sciences Dean's Office for advising on their program. All other students who are enrolled in a major administered by the College of Biological Sciences should see the master or staff adviser in the department office that houses their major, as listed in the catalog. All students, regardless of their college affiliation, working on a major administered by the College of Biological Sciences should obtain university, general education, college and other non-major academic advising from the College of Biological Sciences Dean's Office.

Degree Check

Students are encouraged to meet with their academic adviser at least once a year to ensure timely graduation. Students are required to consult an academic adviser at two points in their academic careers:

- Before accumulating 90 units.
- Before accumulating 135 units.
- In addition, if you are taking courses which, if passed, will cause your unit total to exceed 200 units and you intend to register for the next quarter, you must file a plan with your adviser that leads to graduation within 225 units. If the plan anticipates registering after you have accumulated 225 units, the plan must be submitted to the Dean for approval.

If you do not meet any of these advising requirements, a hold may be placed on your registration.

Degree Requirement Changes or Catalog Rights

On occasion, the faculty makes changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is college policy that you may choose to fulfill the university and college requirements (see General Education Requirement, on page 95 for an exception) as stated in any UC Davis *General Catalog* in effect at the time you were registered at UC Davis. If you have transferred to UC Davis from a community college, state college, or another university, you may follow the requirements as stated in any *UC Davis General Catalog* in effect either during the three years immediately preceding your transfer to UC Davis or at the time you first registered at that institution, whichever is most recent. Once you have chosen the year of the *General Catalog* under which you wish to be governed, you must satisfy all of the university and college requirements specified in that catalog.

With respect to the completion of your major requirements, most of the majors in the College of Biological Sciences require completion of the major degree requirements in effect at the time you officially declared your major. However, because departments differ in how they handle these matters, check with the department or major program office if you have any questions about which requirements apply to you.

College of Engineering

Prerequisite Requirements

Engineering is a discipline that requires mastery of prerequisite coursework prior to moving forward in the curriculum. Students should plan to repeat any engineering requirement in which a grade of *C-* or better is not earned. Students are encouraged to carefully adhere to all prerequisite requirements. The instructor is authorized to drop students from a course for which stated prerequisites have not been completed.

Current Curriculum Requirement

Because Engineering is a rapidly developing profession, the things an engineer needs to know change on an almost daily basis. To respond to this, the faculty make changes to the curriculum on a regular basis. In order to ensure that students graduate with the most current engineering knowledge, College of Engineering students must complete the degree requirements in effect in the academic year of graduation or in the immediately preceding academic year. Students in the class of 2014 will need to complete the degree requirements for the 2012-2013 or 2013-2014 academic year. The College of Engineering *Bulletin* is published every year with current degree requirements. The *Bulletin* is available at *http://engineering.ucdavis.edu/pages/current_students/advising/index.html*.

When degree requirements change, a transition plan is put in place to ensure that students who are getting regular advising and following recommended course sequences will be able to graduate within four years. Contact your departmental adviser or the Undergraduate Advising Office for more specific information or questions. The list of advisers can be found at *http://engineering.ucdavis.edu/pages/current_students/advising*.

Unit Requirements

Each candidate for the degree of Bachelor of Science in Engineering must satisfactorily complete an approved curriculum in engineering. No unit of coursework you complete may be used to satisfy two different degree requirements (except where the catalog specifically indicates otherwise). Detailed requirements for the approved curricula are given in the College of Engineering *Bulletin* at *http://engineering.ucdavis.edu/pages/current_students/advising*. To see

the courses required in your major, consult this section. The minimum number of required units varies with the curriculum, from 180 to 198. You are responsible for planning your program and satisfactorily completing all degree requirements.

You may, for good cause, request a modification of particular degree requirements by submitting a student petition. These petitions, which are available in the Undergraduate Advising Office, can be a valuable aid in resolving individual program conflicts or other special problems. Such petitions are subject to approval by the Undergraduate Educational Policy Committee, a body of eight faculty members and non-voting staff advisers and student representatives. A negative decision by the committee may be appealed to the College Executive Committee.

Transfer students. To be eligible for transfer into the College of Engineering you must have at least ninety transferable quarter units (sixty semester units) from another institution. To be a competitive applicant, you must have a minimum overall GPA of 3.100.

Highest priority for transfer admission is given to California community college transfer applicants who have completed two transferable English composition courses and all of the required lower division engineering coursework offered at the community college they attended.

We give lower priority for admission to community college applicants who are missing one or two of the required lower division courses. Community college applicants will be denied admission if they are missing three or more of the required lower-division courses.

Priority is next given to junior-level transfers from other UC campuses and other four-year institutions in and out of state. These students must also have completed all of the required lower-division coursework.

Successful applicants are admitted to a specific major. You may be limited in your ability to change majors within the college after you are admitted.

Transfer advising and information. For more specific advice on lower-division requirements for community college students, meet with the transfer counselor at your institution or see the Assist website at *http://www.assist.org*. Transfer credit agreements are available on the College of Engineering website at *http://engineering.ucdavis.edu/pages/future_students/transfer_agreements.htm*. You may also contact the College of Engineering Undergraduate Advising Office (530) 752-1979.

California Community college students should consider a Transfer Admission Guarantee (TAG), which is a formal written agreement specifying the courses you need to complete and the grade point average you need to earn to be admitted. A signed agreement guarantees that you will be admitted to UC Davis in the major you want and for the term you have chosen-provided that you complete the agreement and apply for admission during the open filing period. If you would like more information on the TAG program, see your community college counselor or see *http://engineering.ucdavis.edu/pages/future_students/transfers/tag/index.html*.

We also participate in the Transfer Opportunity Program, which encourages community college students to transfer to UC Davis and provides them with services to ease the transition. You can use the Transfer Opportunity Program to get information about admission and transfer requirements, academic programs, financial aid, housing, tutoring, campus life and other services.

Upon admission, transfer students are classified as having upper division status, but are obligated to complete all lower division course requirements for the major before your lower division requirements are considered complete. You may, however, start your upper division coursework while completing your lower division requirements provided you meet all prerequisites for the upper division courses.

The College of Engineering does NOT recommend completion of the Intersegmental General Education Transfer Curriculum (IGETC).

Credit for Open Campus (Concurrent) Courses. Students may apply a maximum of 16 units of credit for courses taken in the Open Campus (Concurrent) Program through UC Davis Extension towards the 180-unit undergraduate degree requirement. The grade points earned when enrolled in Open Campus courses will count toward the calculation of a student's UC GPA upon his/her admission or readmission to regular student status at UC Davis. Students registered at UC Davis may not enroll in Open Campus courses. Open Campus is not available to students that have been enrolled at UC Davis within the last 12 months and have not graduated, unless an exception letter is provided to Extension by the Associate Dean for Undergraduate Studies of the College of Engineering.

Residence Requirement

In addition to fulfilling the university residence requirement, you must complete at least 35 of the final 45 units characteristic of your curriculum in engineering while registered in the College.

Scholarship Requirement

In addition to meeting the university scholarship requirement, you are required to maintain a 2.000 grade point average for all course work within Engineering.

English Composition Requirement; Upper Division

The ability to write well and communicate effectively is cited as one of the most desirable traits sought by prospective engineering employers. Because engineers must be able to explain complex ideas, it is critical that students pay close attention to the development of writing and communication skills. All students admitted to the University must complete the Entry Level Writing Requirement (see page 93) before credit for any composition course or general education writing experience course will be granted.

Once the Entry Level Writing Requirement has been satisfied, there are two distinct composition requirements for engineering students:

- **Lower-division composition.** Can be satisfied by completion of an Advanced Placement English exam with a score of 4 or 5; International Baccalaureate credit for English 3; or completion of one of the following courses with a grade of C- or better: University Writing Program 1, English 3, Comparative Literature 1-4, or Native American Studies 5.
- **Upper division composition.** Requirements vary by major. Please see your departmental adviser to determine the coursework that has been approved for your major.

Please note that when coursework is used to satisfy either of the composition requirements, a grade of *C-* or better must be earned.

General Education writing experience requirement: In addition to the upper- and lower-division composition requirements, all stu-

dents in the College of Engineering must complete three courses that appear on the list of Writing Experience courses in the *General Catalog* or the *Classroom Schedule and Registration Guide*. No general education writing experience credit may be earned prior to completion of the Entry Level Writing Requirement. A course used to complete the lower- or upper-division composition requirement may not be used to satisfy a general education writing requirement.

Engineering Design Requirement

Engineering design is the process of devising a system, component, or process to meet certain needs. Design involves a decision-making process (often iterative), in which the basic sciences, mathematics and engineering sciences are applied to convert resources optimally to meet a stated objective. Among the fundamental elements of the design process are the establishment of objectives and criteria, synthesis, analysis, construction, testing and evaluation. You must take an appropriate amount of design course work through a combination of required and restricted elective courses. Specific comments about design are included in individual curricula descriptions. You should also review the design content of your individual program with your adviser in the course of completing the upper division advising worksheet.

Electives

In general, there are three kinds of elective courses in the engineering curricula; *General Education*, *Technical* and *Unrestricted*. Some transfer students have an additional set of electives; *Physical and Biological Sciences* electives.

General Education Electives. Because, as an engineer, you will be a significant participant in the human setting, you will need to have a breadth of education that will allow you to deal with contemporary social issues and to understand the impact of engineering solutions in the global and societal context. To these ends, you will need to take a minimum of 24 units of credit in meeting the General Education requirement (or 33 units for majors in Computer Science and Engineering). In addition, to add a degree of depth and coherence to the general education requirement, the College of Engineering requires that students complete two upper division topical breadth courses.

Since all engineering programs are in the Science and Engineering GE topical breadth area, you will fulfill the campus GE requirements by taking courses in the Arts and Humanities and Social Sciences areas.

In satisfying the GE requirement note that *(a)* you must take GE courses for a letter grade, and *(b)* you must satisfy the Entry Level Writing requirement before you can receive writing experience credit for any course.

In consultation with your academic adviser, you should attempt to design a coherent approach to contemporary issues by using your GE electives.

In addition, to ensure that your GE program has a degree of depth and coherence, you must take at least two Arts and Humanities or Social Science topical breadth courses that are upper division courses (courses numbered 100 or above).

2010-2011 Technical Electives List

Technical electives permit you to tailor a program to your own academic and career objectives. For some, the technical electives offer the opportunity to prepare for a specific occupation. For others, they offer an opportunity to broaden a background in the sciences and engineering. You may receive technical elective credit up to a maximum of 6 units for any combination of engineering courses numbered 190C, 192, 198, and 199. (You should note that academic credit for 199 courses is limited to a maximum of five units for each substantially different project). Academic credit for engineering internship courses (192) is limited to a maximum of 5 units per quarter. (Individual departments may allow fewer units.) With the exception of the following courses, upper-division courses in chemistry, engineering, mathematics, physics, and statistics may be taken as technical electives.

The courses which may ***not*** be used are:

- Chemistry 195, 197
- Engineering Computer Science 188
- Engineering 198: Gearing Up for Grad School/Undergraduate Research
- Engineering 160 (restricted to one unit of technical elective)
- Mathematics 197TC,
- Physics 137, 160 (both are restricted to one unit of technical elective), 195, 197T
- Statistics 100, 102, 103, 104, 106, 108

In addition to the upper-division chemistry, engineering, mathematics, physics, and statistics courses not excepted above, the following courses, **when not used to satisfy other degree requirements**, ***may*** be taken as technical electives.

- Agricultural and Resource Economics (ARE) 100A, 100B, 106, 112, 118, 130, 132, 135, 136, 138. 139, 140, 155, 156, 157, 171A, 171B
- Animal Biology (ABI) 102, 103
- Animal Genetics (ANG) 101, 105, 107, 111, 120
- Animal Science (ANS) 103, 104, 105, 106, 115, 118, 119, 120, 120L, 123, 124, 125, 126, 127, 128, 129 131, 136, 137, 140, 142, 143, 144, 145, 146, 147, 149, 149L
- Applied Biological Systems Technology (ABT) 101, 110L, 121, 142, 161, 163, 165, 175, 180, 182, 181N
- Atmospheric Science (ATM) 110, 111, 115, 116, 120, 121A, 121B, 124, 128, 133, 149, 150, 158, 160
- Avian Sciences (AVS) 100, 103, 115, 121, 123, 149, 150, 160, 170
- Biological Sciences (BIS) 1A, 1B, 1C, 2A, 2B, 2C, 101, 101D, 102, 103, 104, 120, 120P, 122, 122P, 132
- Biotechnology (BIT) 160, 161A, 161B
- Chemistry (CHE) 2B, 2BH, 2C, 2CH, 8A, 8B
- Economics (ECN) 100, 101, 102, 103, 122, 140
- Engineering (ENG) 17, 35, 45
- Entomology (ENT) 100, 100L, 101, 102, 103, 104, 109, 110, 116, 117, 119, 123, 135, 153, 156, 156L
- Environmental Horticulture (ENH) 100, 102, 105, 120, 125, 129, 130, 133, 144, 145, 150, 160
- Environmental and Resource Sciences (ERS) 100, 100L, 121, 131, 136, 140, 141, 144, 185, 186, 186L,

- Environmental Science and Policy (ESP) 100, 110, 116, 116G, 121, 123, 124, 125A, 125B, 125C, 126, 150A, 150B, 150C, 151, 151L, 155, 155L, 160, 163, 167, 168A, 168B, 170, 171, 173, 175, 178, 179, 179L
- Environmental Toxicology (ETX) 101, 102A, 102B, 103A, 103B, 111, 120, 127, 128, 131, 135, 138, 146
- Evolution and Ecology (EVE) 100, 101, 102, 103, 104, 105, 108, 112, 112L, 115, 117, 119, 134, 134F, 134L, 138, 140, 141, 147, 149, 175
- Exercise Biology (EXB) 101, 102, 103, 110, 111, 112, 113, 115, 116, 117, 125, 126
- Fiber and Polymer Science (FPS) 100, 150, 161, 161L
- Food Science and Technology (FST) 100A, 100B, 101A, 101B, 102A, 102B, 103, 104, 104L, 107, 108, 109, 110A, 110B, 117, 119, 120, 120L, 123, 123L, 127, 128, 131, 159, 160
- Geology (GEL) 17, 32, 35, 36, 50, 50L, 60, 100, 100L, 101, 101L, 103, 105, 106, 107, 107L, 108, 109, 109L, 110, 116, 116G, 130, 131, 134, 138, 139, 142, 143, 144, 145, 146, 147, 148, 150A, 150B, 150C, 152, 156, 160, 161, 162, 163
- Hydrologic Science (HYD) 110, 115, 124, 134, 141, 142, 143, 144, 146, 151, 182
- Management (MGT) 11A, 11B, 100, 120, 140, 150, 160, 170, 180
- Microbiology (MIC) 102, 102L, 105, 120, 120L, 140, 150, 155L, 160, 162, 170
- Molecular and Cellular Biology MCB) 120L, 121, 123, 126, 140L, 142, 143, 144, 145, 150, 150L, 160L, 161, 162, 163, 164
- Nematology (NEM) 100, 110
- Neurobiology, Physiology, and Behavior (NPB) 100 through 169
- Nutrition (NUT) 111AV, 111B, 112, 114, 115, 116A, 116B, 116AL, 116BL, 117, 118, 119A, 119B, 122, 123, 123L, 124, 127, 130
- Physics (PHY) 9D, 9HD, 9HE if not used to satisfy other degree requirements
- Plant Biology (PLB) 102, 105, 108, 111, 111D, 112, 112D, 113, 113D, 116, 117, 118, 119, 123, 126, 140, 141, 142, 143, 144, 145, 146, 147, 148, 150, 152, 153, 154, 157, 158, 160, 161A, 161B, 170, 171, 172, 172L, 173, 174, 176, 178
- Plant Pathology (PLP) 120, 123, 130, 140, 148, 150, 151A, 151B, 155, 185
- Plant Sciences (PLS) any upper division course except 120 and 190 through 199
- Soil Science (SSC) 100, 102, 105, 107, 109, 111, 112, 118, 120
- Wildlife, Fish and Conservation Biology (WFC) 100, 101, 101L, 102, 102L, 110, 110L, 111, 111L, 120, 120L, 121, 122, 130, 136, 141, 151, 152, 153, 154, 155, 156, 157, 158

You are urged to discuss the selection of technical elective courses with your academic adviser.

Unrestricted electives. If your curriculum allows for unrestricted electives, you may count any course for which university credit is allowed as an unrestricted elective in the engineering curricula.

Degree Check

Use a Degree Requirement Check sheet for your major to monitor your progress toward completing degree requirements. These check sheets are available in the Undergraduate Advising Office in 1050 Kemper Hall. The University holds students responsible for knowing and completing all degree requirements. Degree checks are performed as a courtesy to help students make accurate progress toward fulfilling all major, college, and university requirements. Students should request a preliminary degree check three quarters prior to graduation and a follow-up degree check prior to the beginning of a student's final quarter. Requests can be submitted to the Undergraduate Advising Office in 1050 Kemper Hall.

College of Letters and Science

Unit Requirements

A minimum of 180 units is required for the bachelor's degree. Of these units, 64 must be earned in upper division courses.

Registration Beyond the 225-unit Limit. You are expected to fulfill all degree requirements within the 180- to 225-unit range. Once 225 units have been completed (excluding units awarded for College Board Advanced Placement Examinations or International Baccalaureate Examinations), you may register only with the permission of the dean. Such permission is rarely granted and then typically only to allow completion of minimum degree requirements. You will be expected to adhere to a program of courses agreed upon and to meet other conditions that may have been set. Approval must be obtained before you will be permitted to register for courses for the quarter following completion of 225 or more units.

If you are in good standing, you will be able to complete 12 quarters or the equivalent (e.g., four years) of college work even if you have earned more than 225 units before you finish your fourth year. You must petition for continuation, however, and file the quarter-by-quarter course program you have planned.

Unit Credit Limitations

For certain courses, limits have been established on the number of units that can be counted towards the 180-unit minimum required for the degree. To avoid discovering just before graduation that you are short units, keep track of the number of units you have taken in each of the following categories.

Limitation on Credit for Graduate and Professional Courses. Undergraduates may enroll in graduate and professional courses in the 200, 300, and 400 series subject to the restrictions described in Academic Information, on page 70, in this catalog. Graduate and professional courses that have been completed will be listed on the student's transcript in the usual manner. *However, the units earned may be counted toward degree requirements only under the conditions listed below.*

Within the limitations A, B and C given below, undergraduate students in the College may count an unlimited number of units in graduate 200 series courses and up to a combined total of 9 units in 300 and 400 series professional courses toward degree requirements. These units, however, are not counted as upper division units unless this is granted by petition to the dean.

A. The recommendations of the instructor in the course and the department chairperson—in addition to approval from the dean—must be obtained by petition in order to receive credit toward the degree for the following kinds of courses:

- All graduate courses 200–298, whether offered by a department or program outside of or within the College of Letters and Science
- All professional courses 300–398 for teachers offered outside of the College of Letters and Science
- All postgraduate professional courses 400–498 offered outside of the College of Letters and Science
- All variable unit courses 300–398 and 400–498 offered within the College of Letters and Science

B. The minimum eligibility conditions for an undergraduate student in the College to petition for degree credit for a 200, 300, or 400 series course are a UC grade point average of 3.300 and completion of 18 upper division units basic to the subject matter of the course. These eligibility conditions may be waived, however, upon the recommendation of the course instructor and concurrence of the department chairperson if the student's preparation warrants exception.

C. Undergraduates in the College cannot receive degree credit for special study courses 299, 399, or 499.

Limitation on Credit for Units Graded P. Excluding courses that are graded on a *Passed/Not Passed* (*P/NP*) basis *only, the number of units graded P that may be accepted towards a degree in the College of Letters and Science is limited to not more than one fourth* of the units completed in residence on the UC Davis campus.

The Academic Senate limits the total number of courses graded *P, including units earned in courses graded "P/NP only," to one third* of the units completed on the UC Davis campus. This limitation applies to *all* UC Davis undergraduates, including Letters and Science students.

Limitation on Credit for University Extension Courses.

A. UC Davis Extension courses with a designator of "X". Students may apply credit earned through lower division and upper division UC Davis Extension "X" courses towards the 180-unit requirement only with written approval from the dean prior to registration. The degree credit allowed by the dean for such courses is usually less than the unit value listed in the course description. Additional limitations on UC Davis Extension "X" courses include: a maximum of 9 units may be offered for elective credit only and may not be applied toward fulfillment of the Area, Foreign Language, Upper Division, or Residence requirements of the College.

B. UC Davis Extension courses with a designator of "XD". Students may apply credit earned through lower division and upper division UC Davis Extension "XD" courses towards the 180-unit requirement. Additionally, credit from such courses may be applied toward fulfillment of all university, campus, college and major unit and subject matter requirements—including the Area, Foreign Language, Upper Division and Residence requirements of the College—in the same manner that the corresponding regular UC Davis course is so accepted.

C. UC Davis Extension courses with a designator of "XDC" (Open Campus (Concurrent) Program). Subject to the following conditions, students may apply credit earned through lower division and upper division UC Davis Extension Open Campus (Concurrent) courses-i.e., those bearing the "XDC" designator-towards university unit and subject requirements, and, effective Fall 2003, the calculation of the student's UC GPA, upon admission or readmission to regular student status at UC Davis.

- Students on leave of absence and regular status students when matriculated, or regular status students for a period of one calendar year following the last term of regular enrollment at UC Davis, may not enroll in Open Campus (Concurrent) courses. Exceptions to this policy for undergraduate students may be made only under extraordinary circumstances by petition with prior approval by the dean and the Dean of UC Davis Extension.
- Concurrent ("XDC") courses do not count toward satisfaction of the University residence requirement or the residence requirements of the campus or the college.
- Concurrent ("XDC") courses may constitute at most half of the units offered in satisfaction of the upper division requirements of the major.
- In the event that the faculty of the college imposes further restrictions on the number of units of UC Davis Extension Open Campus (Concurrent) course work that may be applied to undergraduate degree programs, the allowable number of units of course work will be determined chronologically, starting with the course completed first. Grade point credit for such courses will be determined in the same manner.

Other Unit Credit Limitations. The following are additional courses that have limits on the number of units that can be counted toward your degree.

- **Internship courses (numbers 92, 192)**: 12 units maximum including internship units taken at other institutions; see Nonstandard courses
- **Music** 130, 131, 140, 141, 142, 143, 144, 145, 146, 147, 154 (combined): 19 units maximum
- **Nonstandard courses (92, 97T, 97TC, 99, 192, 194H, 197T, 197TC, 199 and similar courses)**: 30 units maximum or one-sixth of the units taken at UC Davis, whichever is the smaller; note the separate unit limits on internship, special study and tutoring courses; and major limitations
- **Physical Education 1 and 6 (combined)**: 6 units maximum
- **Special Study courses (99, 194H, 199)**: 5 units maximum in any one quarter; see Nonstandard courses
- **Tutoring courses (97T, 97TC, 197T, 197TC)**: 10 units maximum; see Nonstandard courses, above

Residence Requirement

While registered in the College of Letters and Science, a minimum of 27 upper division units, including 18 upper division units in the major, must be completed on the UC Davis campus; work completed while registered in the UC Education Abroad Program or the UC Davis Extension Open Campus Program does not satisfy campus or College Residence requirements.

Scholarship Requirement

The minimum grade point average to satisfy the scholarship requirement is 2.000 for all courses counted toward the major and for all upper division courses used to satisfy major requirements. Only grades earned in courses taken at UC Davis will be included in the grade point computations. To obtain these minimum averages in the major, you may repeat courses that are graded *D* or *F.* If you have to repeat a course more than once, you need the dean's prior approval.

English Composition Requirement

The English Composition requirement can be met in one of two ways:

1. By passing the English Composition Examination upon completion of 70 units of degree credit (the examination does not yield credit);

OR

2. By completing with a grade of *C–* (or *P*) or better

a. One course from English 3, Comparative Literature 1, 2, 3, 4, Native American Studies 5, or University Writing Program 1, 18, 19;

and

b. One course from University Writing Program 101, 102 series, or 104 series, which must be taken after 84 units have been completed.

Transfer Courses in English Composition. Transfer courses considered by the Dean to be equivalent or comparable to English 3, Comparative Literature 1, 2, 3, 4, Native American Studies 5, or University Writing Program 1, 18, 19, 101, or 104 series, will be accepted toward satisfaction of the English Composition requirement. Note that University Writing Program 101 and 104 series courses or the equivalent must be taken after you have completed 84 units of transferable degree credit.

If your transfer work does not include an acceptable English composition course taken after you had completed or accumulated 84 units, you may fulfill the requirement by examination (see below) or take one course from University Writing Program 101, 102 series, or 104 series at UC Davis.

English Composition Examination. The no-fee examination is typically offered on a Saturday morning in October, January and April; see the *Class Schedule and Registration Guide (CSRG)* for specific dates.

Students are strongly advised to complete this requirement in their junior year. Sign-up for the English Composition Examination at *http://writing.ucdavis.edu/program-information/upper-division-composition-exam-information* from the Monday before the exam date until Friday at noon or until the sign-up sheets are filled. The English Composition Examination form, available at the UC Davis Bookstore, is required. It is recommended that students with disabilities contact the Student Disability Center at (530) 752-3184 and the Entry Level Writing Program Office (530) 752-0450 at least two weeks prior to the exam date to arrange accommodations. No examinations are given during the summer.

Area (Breadth) Requirement

The College Breadth Requirement promotes the intellectual growth of students by asking them to acquire a broader background of knowledge than is provided by the usual major. The Breadth requirement also guides students in exploring the interdependence of knowledge and, in the case of the A.B. degree, provides students the opportunity to become acquainted with performance in the fine arts.

A.B. Degree. Satisfaction of the campus General Education requirement plus completion of one of the following options:

a. A "Mini Minor" consisting of a minimum of three approved upper division courses in a single Letters and Science department or program other than the major (and which are not offered in satisfaction of major requirements);

OR

b. A minimum of three approved lower or upper division courses in Art, Art History, Design, Dramatic Art, or Music from outside the student's major;

OR

c. A certified minor or approved second major from any UC Davis college or program.

The Letters and Science faculty believes that the completion of a certified minor is often the best way for a student to obtain structure and coherence in pursuit of intellectual breadth.

For the purposes of options *a* and *b* above, all courses are considered as approved except: courses bearing less than 3 units of credit, internship courses, non-standard courses, directed group study courses and courses used to satisfy the College English Composition Requirement.

B.S. Degree. A total of 90 units in natural sciences/ mathematics; and satisfaction of the General Education requirement.

Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198 and from 200 through 499 cannot be counted toward satisfaction of the natural sciences/mathematics Area requirement. A maximum of 10 units in special study courses (99, 194H, 199) may be counted toward that portion of the Area requirement. Courses used to satisfy the English Composition and Foreign Language requirements may not be counted toward the Area requirement. Subject to the restrictions just listed, courses acceptable for fulfilling the 90-unit natural sciences/mathematics Area requirement are:

Natural Sciences and Mathematics

- Anatomy, Physiology and Cell Biology 100
- Anthropology 1, 5, 15, 15V, 151, 152, 153, 154A, 154B, 155, 156A, 156B, 157, 158
- Astronomy
- Avian Sciences 13
- Biological Sciences
- Cell Biology and Human Anatomy 101, 101L
- Chemistry
- Engineering 6, 10, 35, 102
- Engineering: Computer Science 10, 30, 40, 50, 60, 120, 122A, 122B, 140A, 140B, 142, 150, 152A, 152B, 153, 154A, 154B, 158, 160, 163, 165A, 165B, 170, 175, 177, 178
- Engineering: Electrical and Computer 70, 170
- Entomology 10, 100, 153
- Environmental and Resource Sciences 131

- Environmental Science and Policy 30, 100, 121
- Environmental Toxicology 101
- Evolution and Ecology
- Exercise Biology 101, 103, 110, 111, 112, 113, 115, 116, 117, 126
- Fiber and Polymer Science 110
- Food Science and Technology 100A, 100B, 101A, 101B
- Geology
- Integrated Studies 8A
- Mathematics
- Microbiology
- Molecular and Cellular Biology
- Neurobiology, Physiology, and Behavior
- Nutrition 10, 111AV, 111B
- Pathology, Microbiology, and Immunology 126
- Physical Education 133, 135
- Physics
- Plant Biology
- Psychology 41, 100, 101, 103A, 103B, 104, 113, 121, 122, 123, 124, 126, 127, 128, 129, 130, 131, 135, 146, 180B
- Statistics
- Wildlife, Fish, and Conservation Biology 10

Foreign Language Requirement; A.B. and B.A.S. Degrees

The College of Letters and Science encourages its students to acquire functional proficiency in at least one language other than English before graduating. Generally speaking, the language programs at UC Davis promote proficiency in each of the "four skills": listening, speaking, reading, and writing. Language learning is a key component of a liberal education. It enables students to communicate effectively in an increasingly internationalized world, enhances their ability to understand ways of thinking different from their own, gives them direct access to cultural production from another time and place, awakens in them an awareness of the conditioned nature of their assumptions about the world, and trains them to cope more effectively with intellectual and practical problems they may face in their future careers. At a minimum, the College requires A.B. candidates to complete three sequenced quarters (15 units) of courses in one foreign language or its equivalent. B.S. candidates, only as required in the major program.

The Foreign Language requirement may be satisfied in any language offered at UC Davis (including ancient languages), or for which transfer credit is allowed from another academic institution (including American Sign Language).

You may also satisfy this requirement by examination in a language not offered on the UC Davis campus. In this case, the Dean's Office will assist you in making arrangements to take an examination on another University of California campus, with a faculty member who teaches the language in question.

Satisfaction of the Requirement. If you plan to apply for a study abroad program with a language prerequisite, you should plan on completing the Foreign Language requirement by the end of your second or third year, depending on the program. The requirement may also be completed through course work in certain study abroad programs that do not have a language prerequisite. The Foreign Language requirement may be satisfied by examination or completion of language courses as follows:

1. **Foreign Language Placement Test.** This test does not yield unit credit—it only determines whether the Foreign Language requirement has been met, or at which point in the language sequence you should enroll. Students must follow the language program's placement policy if they decide to study the language at UC Davis.

   You may validate your knowledge of a language acquired by any means before matriculating at UC Davis by taking this test (or another form of evaluation, if available in the relevant language department). A test may not be taken, however, in a language for which you have already received degree credit. If you are a transfer student, consult your Graduation Requirement Degree Check, which is issued by the Dean's Office within a quarter after enrollment. If you want to continue to study the language at UC Davis, you must consult the relevant language coordinator.
2. **College Board Subject Test.** Earning a qualifying score of at least 550 on a College Board Foreign Language Subject Test satisfies the requirement. This test may be taken at any time during your high school career. Once your score is on file at Undergraduate Admissions, notify the Letters and Science Dean's Office so that satisfaction of the College requirement can be noted on your record.
3. **College Board Advanced Placement Examination.** A score of 5, 4, or 3 on any foreign language College Board Advanced Placement Examination, with the exception of Latin, taken in high school will satisfy the Foreign Language requirement.
4. **International Baccalaureate Higher Level Examination.** A score of 7, 6, or 5 on the French A1, A2 or B Examination, or the Latin A1 Examination taken in high school will satisfy the Foreign Language requirement.
5. **Intersegmental General Education Transfer Curriculum (IGETC).** IGETC is a series of courses prospective transfer students attending California community colleges may complete to satisfy the lower division breadth/general education requirements at the University of California. Students may satisfy the Foreign Language requirement by attaining certification of IGETC completion.
6. **Course Completion in College; or the equivalent.** A.B. and B.A.S. degrees—equivalent of 15-unit level of proficiency in one language at UC Davis (e.g., Spanish 3 or Japanese 3). B.S degree—none, but as is required in the major program.

   If you have successfully completed the second or third year of a language in the tenth or higher grade in high school you may receive unit credit for course 1 of that language when taken at UC Davis, but the grading mode will be *P/NP* only. Although a Passed or Not Passed grade will be charged to your *P/NP* option, no petition is required; see Passed/Not Passed (P/NP) Grading in the Academic Information chapter.
7. **Proficiency Examination.** If you have not completed the required level language course, but assume you have attained equivalent knowledge, you may satisfy the language requirement by passing a proficiency examination. For more information, consult the appropriate foreign language department.

Major Degree Certification

Requirements for major programs are described in the Undergraduate Courses chapter of this catalog. These requirements are fulfilled by completing a major program offered by a teaching department or program committee in the College of Letters and Science (see the list of majors) or an individual major program approved by the College's Committee on Individual Majors.

No more than six units in internship courses (numbered 92, 192, or similar internship courses) may be accepted in satisfaction of the requirements of major programs. Courses numbered 97T, 97TC, 197T and 197TC do not satisfy unit or course requirements in the major.

Degree Check

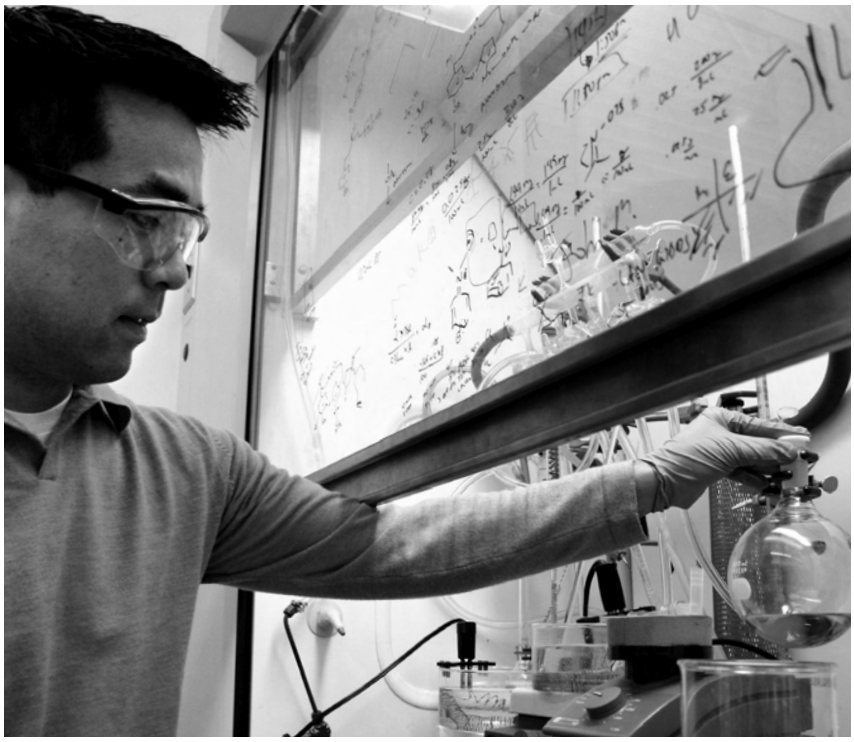
Before the beginning of your senior year, take some time to consider your goals and to plan the academic program for your final year as an undergraduate. To plan properly and to ensure that you get the most out of your remaining education and complete all graduation requirements as well, you should know what requirements remain unsatisfied. To help you in these efforts, the Undergraduate Education and Advising Office provides on its website informational materials and instructions on how to evaluate your progress on college and university requirements; see *http://www.ls.ucdavis.edu/students*. Many departments provide similar information regarding your major requirements.

Once you have completed 135 units of degree credit, you should contact your faculty adviser for a check of your major requirements. At approximately this point, you also should request an official degree check summarizing your progress in fulfilling college and university requirements from the Undergraduate Education and Advising Office; see *http://www.ls.ucdavis.edu/students* for additional information.

Degree Requirement Changes

On occasion, the faculty makes changes in the requirements that students must satisfy to obtain the baccalaureate degree. So that you will not be penalized by changes that may work to your disadvantage and so that you will benefit by changes that assist you in completing your degree requirements, it is College policy that you may choose to fulfill the university and College requirements (see General Education requirement for an exception) as stated in any UC Davis *General Catalog* in effect at any time you were registered as a full-time student at a postsecondary institution of higher education; e.g., community college, college or university.

Once you have chosen the year of the *General Catalog* under which you wish to be governed, you must satisfy all of the university and college requirements specified in that catalog. With respect to the completion of your major requirements, most of the majors in the College of Letters and Science require completion of the major degree requirements in effect at the time you officially declared your major. However, because departments differ in how they handle these matters, check with the department or major program office if you have any questions about which requirements apply to you.



GRADUATE STUDIES

GRADUATE STUDIES

250 Mrak Hall
(530) 752-0650; *http://gradstudies.ucdavis.edu*

UC Davis offers advanced degrees in over 80 graduate programs. A student's graduate study is guided by either departments or graduate groups. Graduate groups are composed of individual faculty members from multiple departments with similar academic interests. The group structure, used extensively at UC Davis, permits faculty to be affiliated with graduate programs in more than one discipline and offers students an interdisciplinary graduate experience that crosses the administrative boundaries of the various departments, colleges, schools, and sometimes campuses. In keeping with UC Davis' progressive spirit, the group structure also allows for evolution of established degree programs and facilitates the development of new ones. More than half of the graduate programs at UC Davis are organized as graduate groups. You will find a complete list of graduate degrees under Degrees Offered by UC Davis, on page 11.

Graduate study is governed by the Graduate Council, a standing committee of the Davis Division of the Academic Senate and by the dean of Graduate Studies. A universitywide Coordinating Committee on Graduate Affairs determines general policies and establishes common procedures.

PREPARING FOR AN ADVANCED DEGREE

Admission to a graduate program at the University of California requires a bachelor's degree that is comparable in quality to a degree from the University of California both in distribution of academic subject matter and in scholarly achievement.

The primary requirement for admission to any program is evidence of intellectual achievement and promise. Your application will be evaluated first on the basis of your transcript to assure that your qualifications meet minimum standards as set by the university and UC Davis Graduate Council. Generally, you must have a minimum B average in undergraduate course work from an institution of acceptable standing to be considered for admission. UC Davis also requires a Statement of Purpose and a Personal History Statement from each applicant. International applicants must demonstrate the ability to understand and use English by submitting TOEFL or IELTS scores. Graduate programs frequently require submission of additional materials such as Graduate Record Examination (GRE) scores, letters of recommendation, and portfolios or examples of written work to assist in selecting from among qualified applicants. Admission to graduate study is limited by the number of spaces available in major programs. Not all eligible applicants can be admitted.

UC Davis is committed to maintaining excellence, preserving fairness and promoting diversity in its student population. In addition to an applicant's past scholastic achievement, admissions criteria include an applicant's potential for service in the field, keeping in mind the needs of our society and of underrepresented and disadvantaged communities. Evaluation criteria also attempt to take into account any prior disadvantages applicants have overcome that may bear on future achievements and services.

APPLYING FOR ADMISSION

To apply for admission, please go online to *http://gradstudies.ucdavis.edu*.

Each program to which you apply must receive a complete application, including the application fee of $70 (U.S.) or $90 (international).

To apply for fellowship, please go online to *http://gradstudies.ucdavis.edu*.

For application deadlines, please go to the Office of Graduate Studies website at *http://gradstudies.ucdavis.edu/prospective/admissiondeadlines.cfm*. It is also recommended that you check the website of the program to which you are applying for their application deadlines.

About Admissions

Applications are accepted for fall quarter only. You may apply for admission to graduate study at *http://gradstudies.ucdavis.edu*. Transcripts of all your undergraduate and previous graduate study, along with other supporting documents (if required), must be sent via mail to your graduate major program office.

You should begin the application process as early as possible in the academic year since many programs have early deadlines. In addition, your chances for appointment as a teaching assistant or graduate student researcher, or of receiving financial support, are enhanced by applying early. The application deadlines are available on the Web as noted above, unless otherwise indicated by the program, or until your proposed graduate program is full, whichever occurs first.

The Graduate Admissions Advisory Committee for the program will submit its recommendation and evaluation to the Office of Graduate Studies; final admission decisions rest with the dean of Graduate Studies. This approval procedure applies to all applicants, including those seeking a transfer to UC Davis from another UC campus.

Applications for the degrees of Juris Doctor, Doctor of Medicine, Doctor of Veterinary Medicine, Master of Business Administration and Master of Preventive Veterinary Medicine must be filed directly with the appropriate professional school.

Readmission

For deadline to file applications for readmission to graduate status with the Office of Graduate Studies, please go to the Graduate Studies website at *http://gradstudies.ucdavis.edu/prospective/admissiondeadlines.cfm*.

If you were formerly registered at UC Davis as a graduate student and wish to return to pursue the same degree objective in the same major, you must apply for readmission and pay the readmission application fee of $60. The readmission application must be filed with the Office of Graduate Studies by May 31 (or earlier if the program specifies an earlier date). Readmission to quarters other than fall is granted on an exception basis by special petition to the Associate Dean for Graduate Students. If you are seeking to return to a new degree program and/or new major, you must apply for admission along with other new applicants. Apply at *http://gradstudies.ucdavis.edu*. Transcripts of all work undertaken since you were last registered in graduate status at UC Davis must be presented with the application. There is no assurance of reentry,

as applicants for readmission will be considered in competition with other applicants for the program.

International Students

http://intlstudents.ucdavis.edu

Assessment of a foreign degree is based on the characteristics of the national system of education, the type of institution attended and the level of study completed.

If you are an international student with credentials from universities outside the U.S., you should begin the application process as early as one year in advance. Official copies or certified copies of all transcripts in English and in the original language are required before your application can be processed. Do not attempt to convert your grade point average or ranking to a U.S. equivalent. The Office of Graduate Studies will determine your eligibility using U.S. guidelines for credential evaluation. Completed online applications from international students along with the nonrefundable $90 application fee must be received by the program to which you are applying by May 31, unless your proposed program has an earlier deadline.

International students must apply at *http://gradstudies.ucdavis.edu*.

English Requirement. Applicants whose native language, or language of prior instruction, is not English must take the TOEFL or IELTS. The minimum score required for admission to UC Davis is a score of 80 based on the reading, listening, speaking and writing categories on the Internet-based test for TOEFL, or at least 7 on a 9-point scale for IELTS. TOEFL scores are valid for two years only. Some programs require higher scores; for more information, see *http://gradstudies.ucdavis.edu/programs*. There is no conditional admission. TOFEL scores must be reported electronically by ETS. The score report is required before application processing begins. You may send a photocopy of your paper report; however, official scores are required before registration if you are admitted.

TOEFL Scores. The Test of English as a Foreign Language (TOEFL) is given by Educational Testing Service (ETS), TOEFL Services, PO Box 6151, Princeton NJ 08541-6151, (609) 771-7100. Request information from *toefl@ets.org* or see *http://www.ets.org/toefl*.

IELTS Scores. The Academic Modules of the International English Language Testing System (IELTS) are designed by the University of Cambridge Local Examinations Syndicate and administered by the British Council worldwide. You are responsible for providing us with an official Test Report Form (TRF) of your IELTS. Remember to order the TRF when you register to take the test. To register for the IELTS, see the IELTS website at *http://www.ielts.org* or contact the IELTS Subject Officer, University of Cambridge, Local Examinations Syndicate, 1 Hills Road, Cambridge, CB1 2EU, United Kingdom.

Visas. If you need a certificate of eligibility for a student visa issued by UC Davis, you will be required to complete a certification of finances form showing the availability of sufficient funding for your graduate program. For complete details, see Services for International Students and Scholars (SISS), on page 69, in the Academic Advising chapter.

PROGRAM OF STUDY

New students are assigned an adviser within the appropriate department or graduate group who assists them in planning a program of study. The program will depend to some degree on the student's undergraduate training and may include undergraduate courses to remove deficiencies. Each student must satisfy the degree requirements as stated by the program and found at *http://gradstudies.ucdavis.edu/programs*.

Additional requirements for study may be established by the department or group and approved by the Graduate Council. These requirements often include a core of required courses, but considerable flexibility is permitted to suit individual needs. Undergraduates at UC Davis who plan to pursue graduate study should consult with their major adviser early in their senior year to guarantee adequate preparation.

A graduate degree is awarded to recognize a student's command of a wide range of knowledge in an academic field. It is not awarded merely for fulfillment of technical requirements, such as residence or the completion of specific courses.

*Graduate Student Deadlines**

	Fall 2010	Winter 2011	Spring 2011	Summer 2011	Fall 2011	Winter 2012	Spring 2012
Deadline for students who expect to complete work for master's degrees to file applications for candidacy with the dean of Graduate Studies	Aug 6	Oct 22	Feb 4	May 23	Aug 5	Oct 21	Jan 30
Deadline for candidates for master's degrees to file thesis with the dean of Graduate Studies	Nov 29	Mar 4	May 27	Aug 26	Dec 2	Mar 5	Jun 1
Deadline for candidates for master's degrees to take comprehensive examination	Dec 10	Mar 19	Jun 9	Sep 13	Dec 9	Mar 24	Jun 14
Deadline for students who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to file applications for candidacy with the dean of Graduate Studies	Aug 6	Oct 22	Feb 4	May 23	Aug 5	Oct 21	Jan 30
Deadline for candidates for the degrees of Doctor of Philosophy, Doctor of Education, and Doctor of Engineering to file dissertation with the dean of Graduate Studies	Nov 29	Mar 4	May 27	Aug 26	Dec 2	Mar 5	Jun 1

* Deadlines are subject to change without notice.

Master's Degree

Students working toward a master's degree must be registered for at least three full-time quarters. Two regular six-week Summer Sessions may count as the equivalent of one quarter. Usually, all work for the master's degree is done in residence on the UC Davis campus—with the consent of the graduate adviser and the Associate Dean for Graduate Students; however, some work taken elsewhere may be credited toward your degree. The limit for such transfer credit is 6 units from another institution, or 12 concurrent units (Open Campus enrollment), or up to one half of the unit requirement if the courses were taken at another UC campus-providing the units were not used to satisfy requirements for another degree.

A master's degree may be awarded upon completion of one of two basic plans in which either a thesis or a comprehensive examination is required.

Doctoral Degree

The Doctor of Philosophy degree, as granted at the University of California, means that the recipient possesses knowledge of a broad field of learning and has given evidence of distinguished attainment in that field; it is a warrant of critical ability and powers of imagination and synthesis. It means, too, that the candidate has presented a dissertation containing an original contribution to the knowledge in the chosen field of study.

Students working toward a doctorate must be registered for a minimum of six full-time quarters. Experience indicates that it takes considerably longer than this to complete a degree program. Two consecutive regular Summer Sessions may count as the equivalent of one regular quarter.

There is no university unit requirement for the doctoral degree. However, individual programs have course requirements that must be completed before admission to the Qualifying Examination.

The Qualifying Examination is administered by a committee appointed by the dean of Graduate Studies. The examination is intended to demonstrate critical thinking ability, powers of imagination and synthesis and broad knowledge of the field of study. Upon recommendation of the Qualifying Examination Committee, and with the approval of the Graduate Council, the examination may be repeated one time.

After successful completion of the Qualifying Examination, the student must file for Advancement to Candidacy for the degree. At this time, a committee is appointed to direct the research problem and guide in the preparation of the dissertation.

Graduate students certain doctoral programs may participate in a Designated Emphasis, a specialization that might include a new method of inquiry or an important field of application that is related to two or more existing doctoral programs. The Designated Emphasis is awarded in conjunction with the doctoral degree and is signified by a transcript designation; for example, "Ph.D. in History with a Designated Emphasis in Critical Theory." Programs approved as Designated Emphases include African American and African Studies, Biology of Vector-borne Diseases, Biophotonics, Biotechnology, Classics and the Classical Tradition, Critical Theory; Feminist Theory and Research; International and Community Nutrition; Native American Studies; Reproductive Biology; Second Language Acquisition; Social Theory and Comparative History; Studies in Performance and Practice; Translational Research; and Writing, Rhetoric, and Composition Studies.

INTERCAMPUS EXCHANGE PROGRAM

A graduate student registered on any campus of the university may become an intercampus exchange student with the approval of the graduate adviser, the chairperson of the department or group on the host campus and the dean of Graduate Studies on both the home and the host campuses.

An intercampus exchange student has library, health service and other student privileges on the host campus, but is considered a graduate student in residence on the home campus. The grades obtained in courses on the host campus are transferred to the home campus and entered on the student's official graduate transcript.

Application forms may be obtained from the Office of Graduate Studies website (*http://gradstudies.ucdavis.edu*) and must be submitted five weeks before the beginning of the quarter in which you wish to participate in the program. Petitions received after the first day of the quarter will not be processed.

FELLOWSHIPS, ASSISTANTSHIPS AND LOANS

http://gradstudies.ucdavis.edu/ssupport

Financial support for graduate study at UC Davis is available in several forms: teaching and research assistantships, financial aid and fellowships/scholarships. For more information, see *http://gradstudies.ucdavis.edu/ssupport*.

Financial aid is awarded on the basis of demonstrated financial need and is administered by the Financial Aid Office. Federal financial aid includes student loans, grants and work-study funding. You may apply for financial aid before you have been admitted. To be considered for financial aid, or for any awards based on financial need, you must file a "Free Application for Federal Student Aid" (FAFSA), at *http://www.fafsa.ed.gov* no later than March 2, prior to the fall quarter enrollment. This form, submitted directly to the Federal Student Aid Program Office, Iowa City, IA, is used to determine financial need only. Contact the Graduate Financial Aid Office for information regarding loans, grants and work-study at *http://financialaid.ucdavis.edu/graduate*.

Graduate fellowships are awarded primarily on the basis of scholarly accomplishment and promise of outstanding academic and professional achievement. Fellowship awards can include a stipend, fees and/or nonresident tuition. Considered in evaluations are the Graduate Record Examination (GRE) scores, undergraduate and graduate grade point averages, academic transcripts, statement of purpose, letters of recommendation and other documentation such as publications or awards. The minimum cumulative undergraduate or graduate grade point average required for a stipend, nonresident tuition fellowships or in-state fee award is 3.000 (*A*=4.000). U.S. citizens and permanent residents are eligible for nonresident tuition fellowships for their first three quarters at UC Davis only. New international students may be awarded nonresident tuition fellowships, in addition to some stipend fellowships, in their first three quarters.

To apply for fellowship, go online to *http://gradstudies.ucdavis.edu*.

For fellowship application deadlines, please go to the Office of Graduate Studies website at *http://gradstudies.ucdavis.edu/prospective/admissiondeadlines.cfm*. It is also recommended that you check the website of the program to which you are applying for their fellowship application deadline.

GRADUATE ACADEMIC CERTIFICATE PROGRAM

A Graduate Academic Certificate (GAC) program is a structured sequence of courses and requirements that focus on a specialty or area of expertise not offered by a regular graduate degree program. GACs are administered by a UC Davis instructional unit (professional school, department, graduate group or a designated emphasis program) and are an additional sequence of training and expertise for graduate students enrolled in a degree program.

GACs consist of a minimum of 12 units of graduate level instruction and are recognized by transcript notation and an official certificate issued by UC Davis with the gold seal of the University of California. GAC programs include Air Quality and Health, Conservation Management and Second Language Acquisition. For more information, see *http://gradstudies.ucdavis.edu/programs/GACs.html*.

GRADUATE CERTIFICATE PROGRAM FOR ENGINEERS

For engineers who already have a degree, the College of Engineering offers Graduate Certificate Programs in various fields of Engineering. The certificate programs consist of course work in selected engineering subjects and require fewer units than the degree programs. The purpose of the Graduate Certificate Program is to provide practicing engineers with an opportunity to develop additional expertise in specific areas and to explore new fields of technical interest.

General requirements for the programs are:

- 15 or 16 units of specified graduate course work, or a combination of specified graduate and undergraduate course work.
- Admission to Graduate Studies.

Further information on the Graduate Certificate Programs may be found within the graduate programs of the College of Engineering; see *http://engineering.ucdavis.edu/pages/future_students/graduates*.

SEMINAR ON COLLEGE TEACHING

Teaching Resources Center
1310 Surge III
(530) 752-6050; *http://trc.ucdavis.edu/trc/ta/courses.html*

The Seminar on College Teaching introduces graduate students to the principles and methods of designing and delivering college-level instruction. The seminar deals with a broad range of skills and issues involved in helping college students learn, including classroom presentations, planning discussions, facilitating active learning, evaluating student learning and employing effective class management strategies.

Depending on the seminar format, participants meet either for weekly two-hour sessions or for a three-day retreat on- or off-campus. Participants also select and complete several assignments, such as developing a syllabus, preparing a lesson plan, investigating an ethical issue related to teaching, creating a teaching blog, or writing a teaching philosophy statement. Readings from various sources complete the seminar experience.

Participants who attend every session and fulfill the required brief assignments in a satisfactory and timely manner receive a certificate of completion that is appropriate to note in a curriculum vitae.

SCHOOL OF EDUCATION

SCHOOL OF EDUCATION

School of Education
School of Education Building
(530) 752-0757; *http://education.ucdavis.edu*

The School of Education offers a wide range of academic and professional development programs that prepare teaching and administrative leaders for the world of public education (P-16), as well as researchers and university faculty. Hallmarks of our work include research that is integrated with practice and policy; deep, sustained engagement with schools and communities; and authentic, collaborative partnerships with those who share our goals.

Through our Ph.D., Ed.D. and M.A. programs, we prepare students to take leadership roles in strengthening schools, community colleges and universities, advancing research and scholarship, and improving education policy and practice. In our credential program (Teaching Credential/M.A.), we prepare students to become teacher leaders and educational advocates for all children.

PROGRAMS OF STUDY

The Minor in Education is considered a foundation for undergraduates who wish to obtain a teaching credential; enter any education-related field such as speech therapy, school counseling, occupational learning, or social work; obtain a master's degree in education or a related field; pursue a doctoral degree in education; or develop a better understanding of issues confronting education today. Education Minor coursework focuses on social foundations of education, psychology of learning, schools as institutions, challenges of educational assessment, and educating diverse populations in a wide variety of disciplines and contexts. As part of the Education Minor, students also complete an internship in a local k-12 school or other learning context.

Undergraduates who are interested in exploring teaching mathematics or science in public schools should contact the MAST Program (*http://mast.ucdavis.edu*) at their first opportunity. The MAST Program offers seminars that give participants experience in elementary, middle school, and high school classrooms. MAST advisors can help students to combine the prerequisites for a credential program with General Education requirements. The Natural Sciences major is sound preparation for teaching the science disciplines offered in middle and high schools. A major in Mathematics will provide the broad understanding needed to teach in public schools.

The Master of Arts in Education provides a course of study for examining research and theory about learners, teachers, schools, and related social institutions. The program prepares professionals to conduct research about the education of children, youth, and adults in a multicultural society. Graduates may assume leadership positions in school districts, state education agencies, and private organizations concerned with instructional research, policy and practice.

The M.A. Program in Education offers (*1*) a general track that serves a broad range of student research interests and career plans, (*2*) a Practicing Teachers track that offers research training and experience focused on classroom-based inquiry and instructional intervention, and (*3*) an M.A./Credential track that integrates the M.A. with the Teaching Credential and focuses particularly on classroom-based research.

Students in the M.A. General and M.A. for Practicing Teachers programs are offered three areas of emphasis: Instructional Studies, Learning and Mind Sciences, and Socio-cultural Studies.

The M.A./Credential track offers an opportunity for qualified students to obtain both a Master of Arts in Education degree and a Multiple Subject or Single Subject Credential (optional BCLAD emphasis) in a combined five-quarter program. We offer Teaching Credential programs in elementary education as well as secondary English, mathematics, social studies, science (biology, chemistry, geo-science, physics), and agriculture.

The Integrated Teaching Credential with Master's Degree Program offers an opportunity for qualified students to complete the requirements for both a Masters of Arts in Education degree and a Multiple Subject OR Single Subject Credential (with optional BCLAD emphasis) in a 15-month, 5 quarter program. The Credential Program prepares students for the teaching profession by immersing them in the total environment of a public school classroom while enrolled in required course work. The course work incorporates a theoretical-practical approach to the teaching-learning process, encouraging close interactions among teacher candidates and teacher education faculty. Students complete requirements for the M.A. degree during two part-time quarters following the credential year. This course work introduces the integration of research into teaching practice, making teachers more informed and pro-active practitioners.

The Capital Area North Doctorate in Educational Leadership (CANDEL) is a collaborative program of UC Davis and Sonoma State University. The program, leading to a Doctor of Education (Ed.D.) degree, is intended primarily for working professionals in P-12 or Community College related leadership positions and can be completed within three years. Graduates of this program will be prepared to lead in educational environments that promote learning, equity and achievement for all students. Armed with real-world, problem-based learning, program graduates will be ready to manage the complexities of educational organizations, effect school change processes and shape the educational policies that bear on the practice of education in the public setting.

The Ph.D. in Education is a multidisciplinary program offered by the Graduate Group in Education, with faculty drawn from education, mathematics, science, social science and humanities units throughout the UC Davis campus. The program provides a challenging course of study for examining research and theory about learners, teachers, schools and related social institutions. Through course work, apprenticeships and mentoring, Ph.D. students are prepared to conduct research and teach about the education of children, youth and adults in a multicultural and multilingual society. Graduates of the program have assumed faculty positions in universities, as well as other leadership positions in universities, school districts, state education agencies and in private organizations that support teaching and learning in schools and communities. The program offers five areas of emphasis: Language, Literacy and Culture; Learning and Mind Sciences; Mathematics Education; Science/Agricultural Education; and School Organization and Educational Policy.

PREPARING FOR THE STUDY OF EDUCATION

Teaching Credential/M.A. Degree Program

Academic preparation for the Teaching Credential Program includes a completed bachelor's degree and a GPA of at least 3.000. For the Multiple Subject credential, many undergraduate majors are appropriate preparation for the program. For Single Subject credential candidates, we recommend an undergraduate major in the intended area of secondary teaching. Use undergraduate internship opportunities to gain classroom experience in the grade levels at which you wish to teach. In addition to these general requirements, learn about current state and UC Davis credential prerequisites at the School of Education website or call our Student Services Office.

- Classroom experience in the appropriate grade levels
- U.S. Constitution course
- Specific preparatory coursework; see adviser for details
- California Basic Educational Skills Test (CBEST)
- For the elementary credential program, the California Subject Examination for Teachers (CSET)
- For secondary credential programs, approved subject matter coursework or the California Subject Examination for Teachers (CSET) for the appropriate subject

Applicants are encouraged to have program prerequisites and testing requirements completed prior to submitting an application. Credential requirements are revised by the State of California. To obtain the most current information, students considering a career in teaching are encouraged to consult with the School of Education advisers throughout their undergraduate career.

M.A. in Education Degree Programs. Applicants to the General Track M.A. and M.A. for Practicing Teachers must have completed an undergraduate degree with a major in a field that supports their intended area of emphasis. A minimum undergraduate GPA of 3.000 is necessary for graduate admission at the University of California, Davis. Please consult with advisers in the School of Education regarding additional testing or supplemental information that may be required for application to a specific program.

Ed.D. Degree (CANDEL). Applicants to the CANDEL program must meet general admission requirements for graduate study at the University of California. Requirements include a bachelor's and master's degree (or equivalent) from an accredited institution, and a GPA of at least 3.000. In addition, applicants will have demonstrated prior experience in administrative or leadership roles in an educational institution or related areas.

Ph.D. Degree. Applicants to the Ph.D. program in Education must have a bachelor's degree, and normally will have completed a master's degree (or equivalent) in a field that supports their intended area of emphasis. A minimum GPA of 3.000 in previous undergraduate or graduate coursework is required for graduate admission at the University of California, Davis. Applicants must demonstrate a high potential for scholarly achievement and research. Individuals possessing graduate degrees in fields other than education are encouraged to apply. Experience in teaching, research, or related areas of education are desirable.

APPLYING FOR ADMISSION

School of Education graduate and teaching credential students are admitted for fall term ONLY. Online applications will be available through the Office of Graduate Studies website at *http://gradstudies.ucdavis.edu/*.

Application deadlines and requirements vary by program. Please consult with a School of Education adviser regarding your program interests. Applicants with underrepresented and nontraditional backgrounds are encouraged to apply.

Minor in Education

No Application Deadline. The Education Minor is open to students in all majors

For more information, see our website at *http://education.ucdavis.edu* or contact the School of Education Student Services Office at (530) 752-0757 or *eduadvising@ucdavis.edu*.

Steps in declaring a minor in education:

- Consult with the education undergraduate adviser in our Student Services Office
- Declare minor by completing a “Declaration of Minor” form available from the Dean's Office in the college of your major

Teaching Credential/M.A. Degree Program

Application Deadline. Please see the School of Education website for Program application information and deadlines at *http://education.ucdavis.edu*.

For more information or instructions please see our website or contact the School of Education Student Services Office at (530) 752-0757 or *eduadvising@ucdavis.edu*.

Steps in the Admissions Process:

- Complete Office of Graduate Studies online application
- Submit nonrefundable application fee payable to UC Regents
- Submit two (2) official transcripts for all college and university work completed
- Submit to the School of Education any supporting documentation: verification of classroom field experience, copies of test scores, etc.

Applicants will be:

- Screened and scheduled for an admissions interview
- Evaluated and reviewed by an admissions committee
- Recommended to Office of Graduate Studies for admission or denial
- Notified of admission or non-admission by the Office of Graduate Studies

M.A. Degree

Masters of Arts in Education General Track and Masters of Arts in Education for Practicing Teachers

Application Deadline. Please see the School of Education website for Program application information and deadlines at *http://education.ucdavis.edu*.

For more information or instructions please see our website or contact the School of Education Student Services Office at (530) 752-0752 or *eduadvising@ucdavis.edu*.

Steps in the Application Process:

- Complete Office of Graduate Studies online application, which includes three (3) uploaded letters of recommendation
- Submit nonrefundable application fee payable to UC Regents
- Submit official transcripts for all college and university work completed
- Submit to UC Davis your official scores (taken within the last 5 years) for the Graduate Record Exam (GRE) General Test

Capital Area North Doctorate in Educational Leadership (CANDEL)

Application Deadline. Please see the School of Education website at *http://education.ucdavis.edu*.

For more information, see the program website at *http://education.ucdavis.edu/programs/candel.html* or contact the School of Education at (530) 754-6664 or *eduadvising@ucdavis.edu*.

Steps in the application process:

- Complete the online application for the Capital Area North Doctorate in Educational Leadership
- Submit application fee (nonrefundable) made payable to UC Regents
- Submit two (2) official transcripts in sealed envelopes as received from the registrar(s) of each college or university attended
- Submit official score(s) for the Graduate Record Examination (GRE) General Test or the Miller Analogies Test (MAT)
- Submit three (3) letters of recommendation written by three employers, professors, or others in a position to assess the applicant's potential for graduate work (must be uploaded online)
- Include a statement of support from employer; a separate document from the applicant's current employer verifying a commitment to provide periodic leave for intensive program activities

Finalists will be interviewed by the CANDEL Admissions Committee.

Ph.D. Degree

Application Deadline. Please see the School of Education website at *http://education.ucdavis.edu*.

For more information or an application package, see the program website at *http://education.ucdavis.edu/programs/PhDoverview.html* or contact the School of Education Student Services Office at (530) 752-0757 or *phdeduadvising@ucdavis.edu*.

Steps in the application process:

- Complete online UC Davis Office of Graduate Studies application
- Submit nonrefundable application fee payable to UC Regents
- Official score(s) for the Graduate Record Examination (GRE) General Test
- Three (3) letters of recommendation
- One (1) official transcript from all institutions attended
- Writing sample (typically a seminar paper, thesis, or published article)

SCHOOL OF LAW

SCHOOL OF LAW

School of Law, Admission Office
(530) 752-6477; admissions@law.ucdavis.edu, http://www.law.ucdavis.edu

The University of California Davis School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. Within a uniquely supportive atmosphere, law students are provided a comprehensive modern law school curriculum taught by a nationally and internationally distinguished faculty. The School offers a full range of traditional law courses, opportunities for practical experience through clinical programs and for in-depth study of an area of law in an individualized program of classroom work, research, writing, or experience in the community. It further provides professional skills training in interviewing and counseling, negotiation and dispute resolution and trial practice. The School seeks to promote critical evaluation of law and legal institutions in a broad perspective, integrating non-legal disciplines with professional legal education.

UC Davis Law School is fully accredited by the American Bar Association, is a member of the Association of American Law Schools and has a chapter of the Order of the Coif.

PREPARING FOR THE STUDY OF LAW

No specific college major is required for admission to the School of Law and there is no prescribed pre-legal program. Your college record and Law School Admission Test (LSAT) score must, of course, demonstrate that you are highly qualified for the study of law.

As a pre-law student, you should plan a course of study that will give you a broad cultural background and include intensive work for a substantial period of time in a selected field of study. Pre-law students should develop the ability to think critically. They should gain an understanding of people and institutions and know how to gather and weigh facts, to solve problems and think creatively. They should be able to read rapidly with comprehension and express themselves clearly, completely and concisely, both orally and in writing.

You can get help with program planning from the Pre-Law Advising Office in 160 South Silo, (530) 752-4475.

For additional information, see the *Official Guide to ABA-Approved Law Schools*, a publication of the Law School Admission Council and the American Bar Association. This book includes information on the law and lawyers, pre-law preparation, applying to law school and the study of law, together with individualized information on all ABA approved law schools. It can be found at college and major bookstores or ordered at http://www.LSAC.org.

APPLYING FOR ADMISSION

Deadline for filing electronic applications for admission to the School of Law:
February 1

1. Request the law school catalog to learn more about the School and the admission process. The electronic application can be accessed at the School's website, http://www.law.ucdavis.edu or at the Law School Admission Council (LSAC) website at http://www.LSAC.org. After completing and submitting the electronic application form, print the certification form and mail it along with the $75 nonrefundable application fee or the UC Davis application fee waiver form to the Office of Admission, School of Law, University of California, 400 Mrak Hall Drive, Davis, CA 95616-5201. The application fee should be submitted in the form of a check or money order made payable to *The Regents of the University of California*.

   The last date for filing completed application forms, together with all supporting documents, including Law School Admission Test (LSAT) scores, Law School Data Assembly Service (LSDAS) reports and letters of recommendation, is *February 1* of the year in which admission is sought. Early filing of all application materials is strongly recommended.

2. You must take the Law School Admission Test and register with the Law School Data Assembly Service so that the score will be reported to the school. You are urged to take the test as early as possible and no later than December preceding the year in which admission is sought; the February test date is too late for Fall admission.

   Testing centers are located in all parts of the United States and in many foreign countries. Tests are given four times a year: February, June, September or October and December.

   To obtain information about the test, specific test dates and the location of testing centers, you can contact the Law School Admission Council (LSAC) at lsacinfo@lsac.org. Both the LSDAS and LSAT registration process are electronic. See the LSAC website to find information about the test, test dates, test centers and to familiarize yourself with the online services. The LSAT and LSDAS Information book is also available on campus in the Law School Admission Office and at the Pre-Law Advising Office.

3. Register with the Law School Data Assembly Service (LSDAS) no later than December 1 at the LSAC website. Arrange to have a transcript from each college or university you have attended sent directly to LSAC. Complete instructions for the online services are available at the LSAC website.

4. Submit an official transcript of college work completed during the first semester or quarter of your senior year directly to the School of Law as soon as it is available. Failure to do so may delay consideration of your application materials. Successful applicants must submit directly to the School of Law a final transcript showing the award of a bachelor's degree.
5. Provide two letters of recommendation from objective and responsible persons to whom you are well known. At least one of these letters should come from a faculty member under whom you studied while in college. UC Davis Law School requires all applicants to submit recommendations to the LSDAS Letter of Recommendation Service for inclusion with your LSDAS report. Your application cannot be considered until two letters have been received.

   Your application will be reviewed by the School of Law Admissions Committee, which seeks students of demonstrated academic ability, as evidenced by a variety of factors including information provided in the required two-four page personal statement and letters of recommendation, in combination with the LSAT scores and the undergraduate grade point average (GPA). The committee seeks students of diverse backgrounds and considers economic factors, obstacles overcome, advanced degrees or other advanced studies, significant work experience and extracurricular and community activities during and after the college years. An applicant's growth, maturity and commitment to the study of law are also major considerations. Students are admitted only on a full-time basis and only in August.
6. When accepted by the School of Law, you are simultaneously admitted to Graduate Studies on the UC Davis campus of the university for the program leading to the degree of Juris Doctor. If you intend to pursue studies leading to other graduate degrees, or wish to become a candidate for a Combined Degree Program, you must make separate application to Graduate Studies or the Graduate School of Management before commencing such studies.

Admission to Advanced Standing

If you have completed at least one year of full-time law course work in another approved law school, you may be considered for admission to advanced standing with credit for not more than one year of such work. The application filing period is June 1–30. No application for advanced standing will be considered until the Office of Admissions has received transcripts for all prior law school work.

Application procedures for advanced standing are the same as described above with the addition of *(1)* a letter of good standing including class rank from the dean of any law school previously attended; *(2)* at least one letter of recommendation from a law professor; *(3)* transcripts of all law school work; *(4)* LSAT score provided as part of an updated LSDAS report from LSAC; and *(5)* an official transcript from the school where you earned your undergraduate degree, stating the date the degree was conferred. The deadline for transfer applications is June 30 of the year for which transfer is sought. Committee decisions on advanced standing are normally made in July or early August of the year in which admission is sought.

Students who have been disqualified at another law school will not be admitted to UC Davis Law School.

Recruitment of Underrepresented Groups

The students and faculty of the School of Law recognize the great need for lawyers from under-represented groups. The School, therefore, actively solicits applications from those groups that reflect the many diverse populations of California but, traditionally, have been underrepresented in the law school population.

The School of Law, in cooperation with the Association of American Law Schools (AALS) and the Council on Legal Education Opportunity (CLEO), participates in programs designed to increase the number of law students from underrepresented groups. CLEO applications may be obtained by writing to Council on Legal Education Opportunity, 740 15th Street, N.W., 9th floor, Washington, D.C. 20005 (202) 216-4343 or toll free (866) 886-4343; *http://www.cleoscholars.com*.

PROGRAM OF STUDY

The professional curriculum requires six semesters for completion and extends over a period of three years. It is for full-time students only; no part-time or evening program is offered. New students are admitted only at the beginning of the fall semester.

After satisfactorily completing the professional curriculum of 88 semester units and the required period of resident study, you will receive the degree of Juris Doctor (J.D.). Students who fail to attain satisfactory grades may be required to withdraw from the School at the end of any academic year.

The first year's work is prescribed and provides the essential foundation for subsequent legal study. Satisfactory completion of the first-year courses is, in all cases, prerequisite to second- and third-year courses. The work of the second and third years is elective. The courses of the professional curriculum are listed in the Undergraduate Courses chapter. Courses taken in summer sessions at other accredited law schools may, with prior permission, be credited toward the units required for the professional degree.

Combined Degree Programs

Students may find a combined degree involving law and another discipline such as economics, business, sociology, or science advantageous. To encourage this kind of study, the School, in conjunction with other schools and university departments, has established Combined Degree Programs. Under these programs, a student may work toward a J.D. degree and a master's degree in another discipline at the same time. In some instances it may be possible to work on a Ph.D. degree as well. Students working toward a combined degree are required to spend their first year at the law school.

Normally, a Combined Degree Program will take at least four years. You will usually be able to earn up to 10 semester-hours of law school credit for work in the related discipline and normally can complete the combined degrees in less time than it would take to earn the two degrees separately. The first year of the Combined Degree Program must be taken entirely in the School of Law. During the remaining years, course work may be divided between the law school and the related discipline. You must satisfy the admission requirements for both programs and file applications with both units.

Students have pursued degree programs in combination with UC Davis departments for the M.A. degree in economics, philosophy, computer science and sociology, and with the School of Management for the M.B.A. degree. The law school will attempt to

work out an additional program if you are interested in other disciplines. You may enroll in the Combined Degree Program any time before the beginning of your third year in law school. If you are interested in pursuing a Combined Degree Program, and have made a separate application to another school or department, you should notify the School of Law if that application is accepted.

The LL.M. Program

(530) 757-8569; Fax (530) 757-8596; *lawinfo@ucde.ucdavis.edu*
http://law.ucdavis.edu/international/

The Law School LL.M. (Master of Laws) program integrates American and foreign law students at all levels of study. For foreign law graduates, the program provides an opportunity to gain a basic knowledge of the United States legal system. United States law school graduates and selected foreign LL.M. candidates may also seek admission on a thesis rather than a course basis. Other opportunities available to all graduate law students include developing special expertise in a particular area and doing special projects and original research under the direction of a faculty member.

Each LL.M. candidate must successfully complete a minimum of 20 semester units of work, usually 10 units each semester. Foreign LL.M. students must enroll in the 1-unit course *Introduction to Legal Research* and the 2-unit course *Introduction to the Law of the United States*. They earn the remainder of their required course credit in regular elective J.D. courses. Each foreign student must also complete an intellectually rigorous legal research and writing project, constituting at least 2 units of credit.

All LL.M. candidates begin their year of study with a complete orientation in the academic and social life of the law school, the UC Davis campus and the city of Davis. LL.M. students are encouraged to enroll in the School of Law's Orientation in U.S.A. Law Program, given in the month before the LL.M. Program begins.

SCHOOL OF LAW ACADEMIC CALENDAR 2010-2011

The School of Law operates on a semester system rather than the quarter system used on the remainder of the UC Davis campus.

	Fall 2010	Spring 2011
Introduction Week	Mon.–Fri., Aug 16–20	
Law School instruction begins	Mon., Aug 23	Mon. Jan 10
Labor Day holiday	Mon., Sep 6	
Veteran's Day holiday	Thurs., Nov 11	
Thanksgiving holiday	Thurs.–Fri., Nov 25–26	
Martin Luther King, Jr. holiday		Mon., Jan 17
Presidents' Day holiday		Mon., Feb 21
Spring recess		Mon.–Fri., Mar 21–25
Law School instruction ends	Fri., Dec 3	Fri., Apr 26
Reading period	Sat.-Mon., Dec 4-6	Wed.–Thurs., Apr 27-28
Law School examination period	Tues.–Wed., Dec 7-22	Fri.–Fri.,
Law School Commencement	Sat. May14	

Tuesday, February 22 is treated as a Monday for class schedule purposes.
Examinations will be held on Sat., May 7.

GRADUATE SCHOOL OF MANAGEMENT

GRADUATE SCHOOL OF MANAGEMENT

Graduate School of Management
Gallagher Hall
(530) 752-7658; *http://www.gsm.ucdavis.edu*

The Graduate School of Management offers a full-time, two-year program leading to the Master of Business Administration degree. The program provides both entry-level and mid-career students with an understanding of management approaches to problem solving and an awareness of the environment within which public and private management decisions are made. Successful completion requires not only a sophisticated understanding of a variety of functional skills in finance, marketing, production, program evaluation and accounting, but also an understanding of computers, information systems and the application of scientific methods to the identification and solution of management problems.

Preparing for the Study of Management

A bachelor's degree and a strong interest in professional management are prerequisites for admission to the Graduate School of Management. The school seeks students from diverse professional and academic backgrounds and does not limit its consideration to applicants from any particular category of majors. Entry-level and mid-career applicants are considered and women and minorities are encouraged to apply.

Although the program has no specific subject prerequisites, it is strongly recommended that students complete the following course work before enrolling:

Accounting—an introductory course in financial accounting

Economics—an introductory course in microeconomics

Mathematics—an introductory course in calculus

Statistics—a course in elementary statistics

APPLYING FOR ADMISSION

Application Deadlines are in November, January, March and May, each year. For the most current information, see *http://www.gsm.ucdavis.edu*.

Admission is for the fall quarter only. Application materials can be obtained in the following ways:

- Apply on-line at our website at *http://www.gsm.ucdavis.edu*
- Print the application materials *http://www.gsm.ucdavis.edu* or contact the Graduate School of Management at *admissions@gsm.ucdavis.edu*
- Call (530) 752-7658

Complete and return your application, with all supporting documents, by the deadlines given above. The application fee is $125.00.

In addition to your application, you need to submit:

- Transcripts from all colleges or universities previously attended
- Graduate Management Admission Test (GMAT) taken within the last five years of the admission date. For further information and registration forms contact: Graduate Management Admission Council; *http://www.mba.com*
- Two letters of recommendation
- Three essays on specific topics
- Interviews are by invitation only

For more information, call (530) 752-7658, or contact *admissions@gsm.ucdavis.edu*.

International Students

International applicants for whom English is a second language must take either Test of English as a Foreign Language (TOEFL) or IELTS within the last two years. For more information, contact TOEFL, Educational Testing Service at *http://www.toefl.org*. or IELTS Int'l at *http://www.ielts.org*.

International students must show proof of financial support for two academic years including fees and living expenses.

Criteria for Admission

Admission to the UC Davis MBA Program is highly selective. The aim of the Admissions Committee is to select those applicants whose academic background, intellectual capability, work experience, demonstrated leadership and communication skills meet the challenging demands of the MBA program and a managerial career. Consideration of an applicant's undergraduate performance includes a review of trends in scholastic performance and areas of academic strength as well as an assessment of overall grade point averages. Admissions standards and grading policies of the schools attended are also considered. Verbal, quantitative and analytical scores on the GMAT are used to evaluate general aptitude for management study. Background and maturity as indicated by employment history, service and activity records, recommendations and the applicant's essays are factors in the committee's evaluation. Professional management experience is not required for admission but is favorably considered.

PROGRAM OF STUDY

The hallmark of the two-year UC Davis MBA program is its flexibility. Students are required to take nine core courses, 27 units, and 45 units of elective coursework for the 72 units required for the degree. The required core curriculum is designed to provide you a foundation in the functional areas of business-accounting, economics, finance, marketing, organizational behavior, statistics, and strategy. These management disciplines are examined through the use of case studies, lectures and the analysis of a few select companies on which to base illustrations and spark discussions. As early as the first year of study, students are able to integrate elective courses into their personal curriculum.

Elective courses at the Graduate School of Management place an emphasis on real-world application of management principles through the use of executive guest speakers who present "live" case study analyses and actual "client" businesses for student projects. Many courses require team projects and emphasize managing by innovation and entrepreneurialism. These team projects develop your independent research abilities and hone your presentation skills.

Most students choose functional concentrations such as:

- Business Analytics and Technologies
- Entrepreneurship
- Finance/Accounting
- General Management
- Marketing
- Organizational Behavior
- Strategy
- Technology Management

MBA Program for Working Professionals

In addition to the full-time program, the Graduate School of Management offers two part-time Working Professional MBA programs in Sacramento and in the Bay Area. Students enrolled in the Working Professional MBA Program pay a flat rate per unit.

Fees are available at *http://www.gsm.ucdavis.edu*.

Application Deadlines are in November, January, March and May, each year. For the most current information, see *http://www.gsm.ucdavis.edu*.

If you would like more information about this program, please contact the Graduate School of Management Admissions at (530) 752-7658 or see *http://www.gsm.ucdavis.edu*.

SCHOOL OF MEDICINE

SCHOOL OF MEDICINE

School of Medicine
http://www.ucdmc.ucdavis.edu/medschool/

The Doctor of Medicine degree requires the satisfactory completion of a four-year course of study composed of 15 consecutive quarters. Course work is conducted on the Sacramento campus, at the UC Davis Medical Center and in nearby affiliated hospitals.

PREPARING FOR THE STUDY OF MEDICINE

When you apply to the School of Medicine, you must submit the results from the Medical College Admission Test (MCAT), so it is recommended that you take the MCAT by the spring before application. Information can be obtained at your undergraduate institution or directly from MCAT Program, Box 4056, Iowa City, IA 52243 (319) 337-1357. To be acceptable for the fall entering class, the MCAT must be taken no later than the previous fall. No scores before June 2007 will be accepted.

Applicants must also meet the following academic requirements:

A. Completed at least three years of study in an accredited college or university in the United States. A minimum of 90 semester hours or 135 quarter units of college-level work is required. Courses in highly specialized fields are acceptable only at the discretion of the medical school.

B. Completed satisfactorily before matriculation each of the following courses:

	Quarter Units	Semester Units
• English, 1 year or its equivalent	12	6
• Biological science, 1½ years* including laboratory, or its equivalent	15	11
• General chemistry, 1 year including laboratory, or its equivalent	12	8
• Organic chemistry, 1 year or its equivalent. If two or more undergraduate organic chemistry courses are offered, it is recommended that you elect the more rigorous option	12	8
• Physics, 1 year including laboratory or its equivalent	12	8
• Mathematics, College level math, including statistics. **Note:** AP credit does not satisfy math requirement	6	4

* Upper Division Science Requirements for Admission. One semester or two quarters of upper division biology. This can be satisfied by courses in Biochemistry, Molecular Biology, Cell Biology or Genetics. Admission to medical school requires that the applicant will have an understanding of fundamental concepts of biomedical science. Although a biochemistry course is not absolutely required for admission, it is strongly recommended.

C. Demonstrate the potential to perform academically at least as well as the average of the current first year class. This reflects the School of Medicine's generally higher standards and our emphasis on potential as judged from the application as a whole, including but not limited to MCAT and GPA scores.

For additional information, contact the School of Medicine Admissions Office at (916) 734-4800.

APPLYING FOR ADMISSION

Deadline for filing applications for admission to the School of Medicine:
October 1

The School of Medicine participates in the centralized American Medical College Application Service (AMCAS). For information on admission to medical school, see the Association of American Medical Colleges (AAMC) at *http://www.tomorrowsdoctors.org*. You need to submit only one application and one set of official transcripts to AMCAS, regardless of the number of member schools to which you are applying. This includes transcripts where community college courses were taken during high school and the summer term(s) before or while attending a four-year college.

Submit the completed application and other required credentials directly to AMCAS for verification, reproduction and immediate distribution to the medical schools you have indicated.

After your AMCAS application has been received by the School of Medicine, the Admissions Office will notify you and may request a secondary application and letters of recommendation along with a nonrefundable application fee of $60. The instructions on how to make the fee payment and where to submit the letters of recommendation are included with the request to submit the secondary application. Recommendations can be in the form of a report by a premedical advisory committee at the college or university where you are enrolled or letters from at least two faculty members who are familiar enough with you and your abilities to make a meaningful evaluation. We recommend that one letter be from a science instructor and the other from a non-science instructor-three to six letters of recommendation suggested.

Applications are accepted by AMCAS between *June 1* and *October 1*. We strongly recommend that you make an early request for application materials from AMCAS and see that the necessary supporting items reach the Committee as soon as possible after the School of Medicine requests them. The Committee reviews only complete application files and schedules interviews for highly qualified applicants throughout the application period and beyond.

A personal interview is usually required before a place in the first-year class can be offered. However, because of the large number of applicants, it is not possible to interview each one and for this reason interviews are held only at the invitation of the Admissions Committee. Interviews take place at the medical school in order to provide you with first-hand knowledge of programs and facilities and give you the opportunity to meet some of the students.

As decisions are made, letters of acceptance are sent; this can be as early as mid-October and as late as September of the following year.

Applicant Selection. The class entering in the fall will be limited to 100 students selected on the basis of academic achievement, academic promise and personal characteristics. The Admissions Committee uses these criteria to determine if a candidate will be able to complete satisfactorily the requirements of the medical curriculum and become excellent medical practitioners. Factors taken into consideration include scholastic records, Medical College Admission Test performance and reports of teachers, advisers and interviewers with regard to intellectual capacity, motivation, emotional stability and personal dedication.

The majority of openings in the entering class will be awarded to students who are California residents. However, the School of Medicine participates in the program of the Western Interstate Commission for Higher Education (WICHE) and residents of participating states will be considered as residents for purposes of admission. For more information, write the WICHE, 3035 Center Green Drive, Suite 200, Boulder, CO 80301-2204.

The School of Medicine selects students for admission with a view to meeting the needs of society, of the medical profession and of the School. Because we live in a pluralistic society, and the educational experience is enhanced by the interaction of students from various backgrounds, the School desires diversity in its student body. This is reflected in the School's commitment to expand opportunities in medical education for individuals from groups underserved in medicine as the result of socioeconomic disadvantage and to increase the number of physicians practicing in underserved areas. Therefore, the Admissions Committee, composed of individuals from a variety of backgrounds and representative of a broad spectrum of medical sciences, evaluates applicants in terms of all relevant factors. These include academic credentials, with due regard to how they may have been affected by disadvantages experienced by the applicant, such personal traits as character and motivation, experience in the health sciences and/or the community, career objectives, and the ability of the individual to make a positive contribution to society, the profession and the School.

Transfer with Advanced Standing

Currently enrolled students (U.S. citizens or permanent residents) in good standing at an accredited ALLOPATHIC medical school in the United States or Canada may apply for admission to the third year of study. In order to provide the best facilities and clinical resources, however, we must limit the number of students in our clinical clerkships. Therefore, applications for transfer to the third year are considered on a space-available basis.

Deadline for application is February 1 of the year of transfer. Applicants must provide medical school transcripts along with other materials and if accepted, must pass Part I of the United States Medical Licensing Examination (USMLE) at their current institution. Available spaces may be filled by the Admissions Committee based upon the entire content of an application, or they may request additional information including letters of recommendation and a personal interview. All applicants for transfer must meet the usual requirements for admission, as well as satisfactorily completing the equivalent of two years of study at the medical school. To apply, interested students must complete the ENTIRE second year curriculum by the end of February at their current medical school and plan to take the USMLE Part I no later than March 15 of that year. Applicants will be notified of the Admissions Committee's decision starting April 1.

PROGRAM OF STUDY

Doctor of Medicine. The curriculum for the M.D. degree is normally a four-year program that provides comprehensive training for the practice of medicine and provides a blend of basic sciences training and clinical experience. The emphasis during the first two years is on the basic-science foundations of medicine. Medical students are introduced to patient care during their very first quarter of study, reflecting the school's commitment to the training of highly skilled clinicians. Several volunteer clinics, largely staffed by UC Davis medical students, provide an ideal setting for hands-on clinical experience.

Combined Degree Program. In addition to the Doctor of Medicine degree, the School of Medicine at UC Davis offers a variety of dual-degree programs through coordination with other graduate groups and divisions. These advanced degrees can couple the M.D. degree with the M.P.H., Ph.D. and M.B.A. that train physicians to meet, respond to and solve the broad diversity of problems and dilemmas facing current and future health care. A new five-year program for students interested in telecommunications-enhanced rural medicine is available. For more information, see *http://www.ucdmc.ucdavis.edu/mdprogram/rural_prime/*.

Meeting this challenge requires those capable of advancing our biological sciences knowledge base and others who can recognize and solve the ethical, political and humanitarian issues that confront the broad delivery of health care to all. Hence, the field for the Ph.D. in the joint degree program at UC Davis can be any graduate program offered on the UC Davis campus, extending beyond the traditional biological sciences boundaries, and strongly encouraging candidates to seek degrees in social sciences and humanities. All requirements for both degrees are met in a course of study that usually lasts seven years. To be admitted, and be concurrently enrolled in both degree programs, students must apply for separate admission to both the M.D. and Ph.D. programs and obtain permission of the School of Medicine M.D./Ph.D. Advisory Committee. Funding for two competitive fellowships is awarded annually to students enrolled in the M.D./Ph.D. program.

Advisory Committee. Inquiries about admission to graduate education should be directed to the Dean of Graduate Studies, University of California, One Shields Avenue, Davis, CA 95616. For more information concerning the combined-degree programs, contact Edward D. Dagang, Office of Admissions, School of Medicine, University of California, 4610 X Street, Sacramento, CA 95817.

Family Nurse Practitioner/Physician Assistant Program. The Family Nurse Practitioner/Physician Assistant (FNP/PA) credential program educates health care professionals to act as members of a health care team and improves the availability of culturally relevant primary health care in underserved populations throughout central and northern California. Enrollment in these courses is limited to students who are enrolled in the FNP/PA program; see Medicine, School of, Department of Family and Community Medicine.

ACADEMIC CALENDAR

The School of Medicine operates on a different schedule from the rest of the campus. A detailed academic calendar may be seen at *http://www.ucdmc.ucdavis.edu/medschool/education/students.html*.

The program is a continuous four-year academic experience. The first year curriculum commences in mid-summer and extends through mid-spring of the following year. There is a six week break between the first and second year for electives, research, and remediation. The second year curriculum begins in early summer and extends through mid-spring of the following year. This is followed by a six-week academic period for preparation for USMLE Step 1. The third year clinical clerkships start in the spring and extend for 48 weeks. The fourth year curriculum begins immediately thereafter and extends through spring of the following year, with graduation in May.

BETTY IRENE MOORE SCHOOL OF NURSING

BETTY IRENE MOORE SCHOOL OF NURSING AT UC DAVIS

Education Building, Sacramento Campus
UC Davis Health System
(916) 734-2145; *http://nursing.ucdavis.edu*

The Betty Irene Moore School of Nursing at UC Davis advances health and ignites leadership through innovative education, transformative research and bold system change.

The school cultivates academic excellence through immersive, interprofessional and interdisciplinary education and research in partnerships with the communities it serves. Faculty, staff and students discover and disseminate knowledge to advance health, improve quality of care and shape policy.

The school was launched through a $100 million commitment from the Gordon and Betty Moore Foundation, the nation's largest grant for nursing education. The Betty Irene Moore School of Nursing cultivates academic excellence and addresses urgent societal needs through:

- Leadership development—build capacity for advocacy and action at all levels
- Interprofessional/interdisciplinary education—health professionals learn multiple perspectives to work and communicate as teams
- Transformative research—apply the science of nursing to improve health and reshape health systems with emphasis on aging, rural health and diverse communities
- Cultural inclusiveness—teach culturally-appropriate approaches to care and involve communities to design and conduct relevant research
- Innovative technology—use technology to create an engaged and interactive approach to nursing education, research and practice

The school will admit its first classes for the Master of Science and the Doctor of Philosophy degree programs in fall 2010 through the Nursing Science and Health-Care Leadership Graduate Degree Program.

Graduates of the Nursing Science and Health-Care Leadership Graduate Degree Program will be prepared for academic and leadership positions exercising scientific thinking, responsibility, initiative, cultural intelligence, knowledge of organizations and system change, teamwork, and a commitment to healthy communities.

The Betty Irene Moore School of Nursing is part of the UC Davis Health System, an integrated, academic health system encompassing UC Davis School of Medicine, the 613-bed-acute-care hospital and clinical services of UC Davis Medical Center and the 800-member physician group known as the UC Davis Medical Group. For more information, see *http://nursing.ucdavis.edu*.

PROGRAMS OF STUDY

Nursing Science and Health-Care Leadership

The UC Davis Nursing Science and Health-Care Leadership Graduate Degree Program prepares nurse leaders, researchers and faculty in a unique interdisciplinary and interprofessional environment. The graduate group is composed of faculty from nursing, medicine, health informatics, nutrition, biostatistics, public health and other fields. Nursing Science and Health-Care Leadership research and education emphasizes healthy systems and healthy people. Healthy Systems—improving health-care systems and designing policies to be effective, efficient and responsive. Research in healthy systems includes health policy, organizational change, informatics, implementation science and leadership. Healthy People—promoting health for individuals, families and populations in partnership with communities, with an emphasis on aging, rural and diverse populations. Research for healthy people includes community health, public health, epidemiology, gerontology, rural health and health disparities.

Master of Science

Master's degree students are those with experience and/or interest in transforming health care through nursing education and research. They will focus on important societal health issues through the work of advancing health and improving the systems that provide health services.

Graduates of the Nursing Science and Health-Care Leadership Graduate Degree Program will be prime candidates for formal leadership positions. Graduates will exercise leadership through scientific thinking, responsibility, initiative, cultural inclusiveness, knowledge of organizations and system change, and a commitment to healthy communities.

The master's degree program is a professional degree program that prepares graduates for health-care leadership roles in a variety of organizations and as nurse faculty at the prelicensure nursing level. Some examples include:

- Leaders of health organizations and agencies-such as community clinics, trade associations, advocacy groups-improving quality of care and work environments, and advancing outcomes and health care effectiveness
- Community college and other prelicensure nursing faculty-teaching the next generation of nurses
- Legislative and governmental agency staff and leadership developing, influencing and implementing policy to improve access and outcomes; not limited to health agencies but other organizations that provide public infrastructure such as transportation, planning or parks and recreation
- Careers across the health-care sector, such as insurance, pharmaceutical, hospital, home health, aging support services, adoption services, chronic illness support services and medical equipment industries fostering the integration of excellence in clinical care, management, policy, education and research

Doctor of Philosophy

Students with experience and/or interest in leading the transformation of health care through nursing education and research are ideal for the Doctor of Philosophy program. Students focus on important societal health issues through the work of advancing health and improving the systems that provide health services.

Graduates of the Betty Irene Moore School of Nursing will be prime candidates for formal leadership positions. Graduates will exercise leadership through scientific approaches, vision, initiative, cultural inclusiveness, teamwork, and a commitment to assuring health care is highly effective, compassionate and accessible.

The academic doctoral program prepares graduates as nurse faculty/researchers at the university level and health-care/policy leaders to:

- Conduct transformative research
- Educate health professionals and researchers
- Effect system change
- Influence and implement policy
- Advance health from multiple settings

PREPARING FOR THE STUDY OF NURSING

The Nursing Science and Health-Care Leadership Graduate Degree Program is ideal for students who:

- Want to make a difference
- See problems and think of solutions
- Want to lead the transformation of health care
- Believe that good health is not defined in physical terms alone but has many dimensions, including social, political, psychological, economic, emotional, intellectual and spiritual
- Find value in diversity of thought, belief, language and culture
- Want to unleash the power and passion of nursing

APPLYING FOR ADMISSION

Betty Irene Moore School of Nursing students are admitted for **fall term only**. Online applications are available through the Office of Graduate Studies website at *http://gradstudies.ucdavis.edu*.

Application deadlines and requirements vary by program and year. For more information, please see the School of Nursing website at *http://nursing.ucdavis.edu* or contact the School of Nursing at (916) 734-2145.

MASTER OF SCIENCE

Admission Requirements

- Current registered nurse (R.N.) licensure
- Bachelor's degree in nursing or a related field
- Minimum undergraduate G.P.A. of 3.000
- G.R.E. is *not* required
- Three (3) letters of recommendation
- Statement of purpose and personal history statement describing the applicant's background and experience, rational for seeking the degree and intentions for applying the newly-obtained knowledge and skills

Degree Program Requirements

Required courses for the master's degree program include six graduate-level core courses-Health Status and Care Systems, Implementation Science, Leadership in Health Care, Quantitative Skills for Change, Community Connections and an Informatics course-and the Master's Degree Seminar. A minimum of 31 quarter units of upper-division and graduate courses and a thesis are required for graduation.

DOCTOR OF PHILOSOPHY

Admission Requirements

- Bachelor's degree in nursing or a related field
- Minimum undergraduate G.P.A. of 3.000
- G.R.E. is *not* required
- Three (3) letters of recommendation
- Statement of purpose and personal history statement describing the applicant's background and experiences, rationale for seeking the degree and intentions for applying the newly-obtained knowledge and skill
- Application process may require an interview

Degree Program Requirements

Required courses for the doctoral degree program includes five graduate-level core courses-Health Status and Care Systems, Implementation Science, Leadership in Health Care, Research Design in Nursing and Health Care and an Informatics course-and the Doctoral Seminar. A series of courses in research methods is also required.

The doctoral program requires a minimum of 43 upper-division and graduate course credits, including electives.

Doctoral students are required to pass an oral qualifying examination. The intent of the oral qualifying examination is to determine whether the student is adequately prepared and sufficiently intellectually independent to conduct doctoral-level research. The exam may include both an oral component as well as the student's proposal for the dissertation research.

A doctoral dissertation is required. Students will enroll in dissertation credits as full-time students after the qualifying exam until the dissertation is complete (approximately 36 credit hours).

ACADEMIC CALENDAR

The School of Nursing operates on the traditional UC Davis campus quarter system. Core nursing courses are offered in fall, winter and spring quarters only.

SCHOOL OF VETERINARY MEDICINE

SCHOOL OF VETERINARY MEDICINE

School of Veterinary Medicine
Office of the Dean
Surge IV
(530) 752-1383; *http://vetmed.ucdavis.edu*

The mission of the School of Veterinary Medicine is to provide the best possible health care for animals through teaching, research and public service. Students are offered a rigorous four-year program of study that prepares them for diverse career opportunities in veterinary medicine.

PREPARING FOR THE STUDY OF VETERINARY MEDICINE

To be considered for admission to the School, you must have completed 108 quarter units (72 semester units) in an accredited college or university and have completed the following courses:

Lower Division Required Sciences	Quarter Units
General Chemistry	15
Organic Chemistry	6
Physics	6
Biological Sciences	14
Upper Division Required Sciences	
Genetics	4
Biochemistry	5
Physiology	5
Additional Courses	
Required English	12
Required Humanities and Social Sciences	12
Required Statistics	4

To convert semester units to quarter units, multiply by 3/2. For example, a four-unit semester course is equivalent to a six-unit course in the quarter system.

You should plan your pre-veterinary medical education carefully. An undergraduate major should be selected on the basis of individual interest and aptitude; there is no advantage gained toward admission by selecting one major over another. If you have definite areas of interest within the general field of veterinary medicine, you are encouraged to take courses (for example, computer science, agricultural economics, molecular and biochemical genetics) that will broaden your background in these areas. Some specialized areas include laboratory animal medicine, exotic animal medicine, public health, food animal practice and biomedical research.

Examinations. You must take the General Aptitude Test of the Graduate Record Examination (GRE) no later than October 1st of the year you apply for admission. Applications for the exams and additional information may be obtained from the Educational Testing Service at *http://www.GRE.org*.

Grade Point Average. To be considered for admission, you must have a minimum grade point average of 2.500 for both the required sciences and the cumulative grade point average. Applicants who do not meet the minimum grade point average can qualify for admission by receiving GRE scores in the upper 30th percentile for the combined General Aptitude Test scores. Applicants who do not have transcripts with letter grading can qualify for consideration with these same scores or by receiving a bachelor's degree with honors.

Practical Experience. Admission to the School requires extensive experience with animals. This experience must entail more than having family pets and should include experience with several animal species if that experience includes activities that give you an appreciation and understanding of the veterinary profession. The minimum requirement for animal, veterinary and biomedical science experience is 180 hours (4.5 weeks). This experience must also include working with veterinarians, to give you an understanding of the duties and responsibilities of a practitioner and the breadth of veterinary medicine.

APPLYING FOR ADMISSION

October 1 is the deadline for filing applications for admission to enter the School of Veterinary Medicine the following fall quarter.

Students are admitted to the School of Veterinary Medicine in the fall only. All applicants must apply through the online Veterinary Medical College Application Service-VMCAS at *https://www.vmcas.org*.

Students interested in admission to the School of Veterinary Medicine should see the School's Guide for Prospective Students at *http://www.vetmed.ucdavis.edu/StudentPrograms/StudentGuide_Post.cfm* for detailed information on admissions requirements.

Applicants with disadvantaged backgrounds (cultural, economic, social, educational, disabled and other factors) are encouraged to apply to the Veterinary Medical Opportunity Program (VMOP). For further information, see *http://www.vetmed.ucdavis.edu/StudentPrograms/subpages/vmop_application.pdf*.

Letters of Evaluation. Three letters of evaluation are required. Letters should be requested from those who know you well, who understand academic and professional demands and have had the opportunity to evaluate your personal qualities and potential as a professional person. The evaluator should be willing to write a thorough, comprehensive letter on your behalf.

Interviews. Interviews may be requested, as deemed necessary, by the Dean and Admissions Committee to obtain additional information. The Dean and Admissions Committee may require additional evaluation procedures for selecting candidates for admission.

Out-of-State and Foreign Applicants. California residents are given priority for admission to the school. A small number of uniquely qualified applicants who are not California residents may be admitted as nonresidents. The criteria for determining residency are explained in Residence for Tuition Information in the Appendix of this catalog. Specific questions should be addressed to the Residence Deputy, Office of the University Registrar, One Shields Avenue, University of California, Davis, CA 95616. No other persons are qualified to give rulings on residency.

If you are from a country other than the United States, you must include a certified English version of your college transcript and, if English is your second language, the official scores from the Test of English as a Foreign Language (TOEFL) taken within five years of the date when your application is submitted.

CRITERIA FOR SELECTION

I. Academic Factors (50-60%)

A. College course work:

- Overall GPA in undergraduate/graduate course work
- GPA of required pre-veterinary medical science courses
- GPA of last two years of undergraduate/graduate work; minimum of 72 quarters or 45 semester units)

B. Graduate Record Examination (GRE):

- General Aptitude Test (Verbal, Quantitative and Analytical Writing)

II. Non-Academic Factors (40-50%)

A. Personal Statement

B. Letters of Evaluation

C. Veterinary and Animal Experience

D. Interview

Non-academic factors will be evaluated based on the following criteria: understanding of the veterinary profession and the responsibilities of being a veterinarian; a demonstrated interest in serving the public through the profession of veterinary medicine; and the possession of maturity, motivation and other qualities needed for successful academic and professional work.

PROGRAM OF STUDY

Doctor of Veterinary Medicine. To receive a Doctor of Veterinary Medicine degree, students must study veterinary medicine for the equivalent of 13 quarters. A minimum grade point average of 2.000 (*C*), computed on all courses taken while in the School, is required and students must satisfactorily complete all required work as determined by the faculty of the School.

Master of Preventive Veterinary Medicine. Applicants for candidacy to the Master of Preventive Veterinary Medicine (M.P.V.M.) degree program must have completed the Doctorate in Veterinary Medicine or the equivalent; final admission decisions rest with the M.P.V.M. Admissions Committee. Application deadlines for the upcoming academic year are March 1 (international applicants) and April 1 (domestic applicants).

The M.P.V.M. degree normally takes one year to complete; however, some students may require as much as two years to finish the program. Candidates for the M.P.V.M. degree must satisfactorily complete a total of 40 units of course work while in residence. This includes 28 units of required courses in epidemiology, biostatistics, and research methodology and a minimum of 12 units of approved elective courses in areas such as epidemiology, biostatistics, herd health management, animal health economics, simulation modeling, veterinary medical data management, zoonoses and veterinary public health. Students must also complete a research study which culminates in a written report and oral presentation.

A committee consisting of three faculty members reviews each paper for acceptability and assigns an appropriate grade.

Application forms and information about the program are available from the Director, M.P.V.M. Program, Office of the Dean, School of Veterinary Medicine, University of California, One Shields Avenue, Davis, CA 95616; or see *http://vetmed.ucdavis.edu/mpvm/index.cfm*.

A combined D.V.M./Ph.D. program is offered. Information regarding the Veterinary Scientist Training Program (VSTP) is available at *http://www.vetmed.ucdavis.edu/VSTP*. Information on additional combined degree programs can be found on the Graduate Studies website at *http://www.gradstudies.ucdavis.edu/programs/*.

Combined Degree Programs. Students may enroll in combined degree programs. General information regarding these degrees can be found in the Announcement of Graduate Studies, available from Graduate Studies, University of California, One Shields Avenue, Davis CA 95616. For more detailed information, write to the chairperson of the department in which you want to study and the School of Veterinary Medicine.

ACADEMIC CALENDAR 2010–2011*

Summer Quarter 2010	
4th Year Orientation Session	Monday, Jun 14
4th Year Senior/Summer Clinics begin	Monday, Jun 14
Fall Quarter 2010	
Instruction begins for 1st-year students	Wednesday Sep 1
Labor Day Holiday	Monday, Sep 6
Instruction begins for 2nd and 3rd year students	Tuesday, Sep 7
Rosh Hashanah	Thursday, Sep 10
Veteran's Day Holiday	Thursday, Nov 11
Thanksgiving Holiday	Thursday-Friday, Nov 25-26
Instruction ends	Friday, Dec 3
Finals end	Friday, Dec 10
4th Year Clinics end	Thursday, Dec 23
Winter Quarter 2011	
Instruction begins	Monday, Jan 3
4th Year Clinics begin	Monday, Jan 3
M. L. King Holiday	Monday, Jan 17
President's Day Holiday	Monday, Feb 21
Instruction ends	Friday, Mar 11
Finals end	Friday, Mar 18
Spring Quarter 2011	
Instruction begins	Monday, Mar 28
Awards Ceremony	Wednesday, May 11
Memorial Day Holiday	Monday, May 30
Instruction ends	Friday, Jun 3
4th Year Clinics ends	Wednesday, Jun 8
Finals end	Thursday, Jun 9
Commencement	Friday, Jun 10

*All dates are subject to change without notice.

PROGRAMS AND COURSES

UNDERGRADUATE COURSES

Lower Division Courses

These courses, **numbered 1–99**, are open to all students for lower division credit, but are designed primarily for freshmen and sophomores.

Upper Division Courses

These courses, **numbered 100–199**, are open to all students who have met the necessary prerequisites as indicated in the *General Catalog* course description. Preparation should generally include completion of one lower division course in the given subject or completion of two years of college work.

VARIABLE-UNIT COURSES

Subject to approval by the department chair, an instructor may arrange to give a special study course (numbers 90X, 92, 97T, 97TC, 98, 99, 190X, 192, 194H, 197T, 197TC, 198, 199) to interested students. These courses may be offered any fall, winter, or spring quarter as determined by the department.

- **90X/190X (Seminar)** are seminar courses for in-depth examination of a special topic within the subject area.
- **92/192 (Internship)** courses enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities. Students must have completed 84 units before enrolling in course 192.
- **97T/197T (Tutoring)** and **97TC/197TC (Tutoring in the Community)** are courses for students who want to tutor in a subject in which they are proficient—generally in their major field—while enrolled as an undergraduate.
- **98/198 (Directed Group Study)** courses are set up on a one-time basis for a group of students in a subject for which no regular courses have been established.
- **99 (Special Study for Undergraduates)** is a course arranged for an individual student who shares, with an instructor, an academic interest that cannot be accommodated within the formal course structure.
- **194H (Special Study for Honors Students)** courses are for individual students with honor status, as determined by the department offering the course and who have completed 84 units.
- **199 (Special Study for Advanced Undergraduates)** courses are the upper division counterparts of course 99 and involve supervised independent study and research requiring adequate background in the subject proposed for study as well as prior completion of 84 units.

Credit in courses 99, 194H and 199 is limited to a total of 5 units per term.

Autotutorial Courses are courses in which students instruct themselves at their own pace. These courses can be identified by the letters AT at the end of their course numbers, e.g., 13AT, 141AT.

Virtual Courses are courses in which instruction is delivered on the Internet. These courses can be identified by the letter V at the end of their course numbers, e.g., 10V, 162V.

Research Conference Courses are courses in which advanced undergraduate students may participate in critical discussions of staff research activities. These one-unit courses are numbered 190C and are graded on a Passed/Not Passed basis.

GRADUATE COURSES

Courses **numbered 200–299** are open to graduate students and to undergraduates who have completed 18 units of upper division work basic to the subject matter of the course. However, admission is subject to the approval of the instructor in charge of the course. Grading in 290C courses and most variable-unit 299 or 299D courses is Satisfactory/Unsatisfactory. Check the course description for grading information.

PROFESSIONAL COURSES FOR TEACHERS AND NURSE PRACTITIONERS

Courses **numbered 300–399** are teacher-training courses in the School of Education and in other departments and are especially intended for teachers or prospective teachers. Courses designed to provide instruction to teaching assistants are included. Courses for certification of family nurse practitioners and physician assistants are also included. These courses are open only to students enrolled in those programs.

OTHER PROFESSIONAL COURSES

Courses **numbered 400–499** are professional training courses. Graduate students should consult their faculty adviser or contact the Graduate Studies Office before registering in 400 series courses to determine if graduate credit may be awarded for the course in question.

PREREQUISITES

Prerequisites for courses should be noted carefully; the responsibility for meeting these requirements rests on the student. If you can demonstrate that your preparation is equivalent to that specified by the prerequisites, the instructor may waive these requirements for you. However, the prerequisite that requires that you complete 84 units before registering in the course may not be waived. The instructor in charge of a course may request that the Registrar drop from the course any student who has enrolled without completing the published prerequisites if, in the judgment of the instructor, failure to have completed that work seriously reduces the probability that the student will successfully complete the course. An instructor who intends to exclude a student for this reason must notify the student before taking action.

COURSE DESCRIPTIONS

Below is a sample of how a course is listed in this catalog.

> **190. Proseminar in Nutrition (1)**
> Seminar—1 hour. Prerequisite: senior standing; course 111. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated twice for credit with consent of instructor.—I, II, III. (I, II, III.) Zidenberg-Cherr

Top line is course number; title; units.

Paragraph following is course instructional format; prerequisite; course description; grading, if other than letter grading; quarter offered 2010–11; quarter offered 2011–12 (in parentheses); instructor (if specified).

Quarters offered is the quarter in which a course is intended to be given is shown as follows:

- **I.** Fall Quarter (September to December) or Fall Semester (August to December), School of Law
- **II.** Winter Quarter (January to March) or Spring Semester (January to May), School of Law
- **III.** Spring Quarter (April to June)
- **IV.** Summer Quarter (July to September) for students in the School of Medicine only

The quarter a course is offered is subject to change. For more information, consult the *Class Schedule and Registration Guide (CSRG)* or contact the department.

Alternate Year Designation

Some course descriptions will include the phrase "Offered in alternate years." If the course will be offered in the 2010–11 academic year, the quarter designation immediately follows the description. If the course will be offered in the 2011–12 academic year, the quarter designation is inside parentheses.

Multi-Quarter Courses

A series of course numbers followed by two or three letters (for example, Physics 110A-110B-110C) is continued through three successive quarters, ordinarily from September to June. The first quarter course listed this way is a prerequisite to the second and the second is prerequisite to the third. On the other hand, where A and B portions of a course are listed separately (for example, Economics 160A and 160B), the A course is not a prerequisite to B, unless it is specifically mentioned in the list of prerequisites.

Expanded Course Descriptions

Because of space limitations, you may find that the descriptions in the *General Catalog* do not include all the information you would like about a course. The faculty has responded to this need by writing the "Expanded Course Descriptions," giving more detailed explanations about each course offering. These descriptions are available each quarter to assist students in selecting their courses. They contain such information as texts used, preparation required of students, basis for grading, course format, special assignments (papers, field trips, etc.) and a topical outline of the material to be covered.

Copies of the "Expanded Course Descriptions" are available for on-campus use at the College dean's offices, advisers' offices, advising centers, and departmental offices.

The course offerings and instructors listed in this catalog are subject to change without notice. For more current quarter offerings and instructors, refer to the *General Catalog Supplement* at *http://registrar.ucdavis.edu/UCDWebCatalog*.

African American and African Studies

(College of Letters and Science)

Milmon Harrison, Ph.D., Director

Program Office. 2201 Hart Hall
(530) 752-1548; *http://aas.ucdavis.edu*

Committee in Charge

Christine Acham, Ph.D.
(African American and African Studies)
Wale Adebanwi, Ph.D.
(African American and African Studies)
Moradewun Adejunmobi, Ph.D.
(African American and African Studies)
Milmon Harrison, Ph.D.
(African American and African Studies)
Bettina Ng'weno, Ph.D.
(African American and African Studies)
Halifu Osumare, Ph.D.
(African American and African Studies)
Patricia A. Turner, Ph.D.
(African American and African Studies)

Faculty

Christine Acham, Ph.D., Associate Professor
Wale Adebanwi, Ph.D., Assistant Professor
Moradewun Adejunmobi, Ph.D., Professor
Milmon F. Harrison, Ph.D., Associate Professor
Bettina Ng'weno, Ph.D., Associate Professor
Halifu Osumare, Ph.D., Associate Professor
Patricia A. Turner, Ph.D., Professor

Emeriti Faculty

John Stewart, Ph.D., Professor Emeritus

Affiliated Faculty

Kristee Haggins, Ph.D., Adjunct Assistant Professor

The Major Program

African American and African Studies is a field of study in the humanities, arts, and social sciences that provides students with a multi-disciplinary learning experience. In addition to courses offered within African American and African Studies, students have the option of taking selected courses in other programs and departments that complement courses offered within African American and African Studies. Majors and minors are also encouraged to take advantage of internship opportunities.

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

Career Alternatives. Students completing the African American and African Studies major are well prepared for graduate study in psychology, education, sociology, human development, history, etc. Majors in African American and African Studies can also pursue professional training in fields such as pharmacy, medicine, or law. Graduates with this major have also pursued employment opportunities in the federal and state government, in international development agencies, in human service units, in county social service programs, and counseling services. African American and African Studies is also an appropriate background for work in community organizations like the Urban League, NAACP, Urban Affairs, and the Office of Economic Opportunity, and for teaching at all levels.

A.B. Major Requirements:

The major program must be developed in consultation with an African American and African Studies faculty member, and approved by the program's Major Adviser.

UNITS

Preparatory Subject Matter 28

One course from African American and African Studies 10, 12 4
One course from African American and African Studies 15, 50, 51, 52, 80 4
One course from Anthropology 2; Economics 1A, 1B; Geography 2; Sociology 1; Political Science 1, 2; Psychology 1 4
One course from Chicana/o Studies 10; Native American Studies 1, 10; American Studies 10; Asian American Studies 1, 2 4
Two courses from History 15, 17A, 17B..... 8
Four units from African American and African Studies 16, 51, 54, 154, 155A, Dramatic Art 41A, 41B, Music 28, 105, 106..... 4

Depth Subject Matter 36

One course from African American and African Studies 100, 101, 107A, 107B, 107C, 110, 145B, 180 4
One course from African American and African Studies 150A, 150B, 151, 152, 155A, 156, 157, 160, 170, 171, 175A, 175B, 181, 185..... 4
One course from African American and African Studies 111, 123, 130, 133, 141, 145A, 156, 162, 163, 165, 172 4
A coordinated program of upper division courses, selected and approved in consultation with the major adviser and chosen to reflect the student's major emphasis 24
Possible areas of emphasis include the following: Creative arts in the black community worldwide, social and political trends in the global black community, African American society and culture, Africa, African Diasporas. These areas of emphasis are offered as guidelines for students in the major. They are not the only areas of emphasis that students may choose for the major.

Related Upper Division Courses

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

American Studies 156; Anthropology 104N, 139AN, 140A, 140B; Art History 150; Community and Regional Development 151, 151L, 152, 153, 172; Comparative Literature 154, 165; English 167, 178, 179, 181A, 181B; History 102 (O), 115A, 115B, 115C, 115D, 116, 177A, 177B, 178A, 178B; Political Science 134, 149, 176; Sociology 128, 129, 130, 134, 137, 143A, 145A, 145B, 130; Dramatic Art 155A; Women's Studies 160, 178C, 180, 182

Total Units for the Major 64

Major Adviser. C. Acham

Minor Program Requirements:

UNITS

African American and African Studies ... 24

Select one course from African American and African Studies 10, 12, 15, 17, or 80 4
Select any five upper division courses offered in African American and African Studies, but not including African American and African Studies 154.

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

American History and Institutions. This University requirement can be satisfied by completion of African American Studies 10, 100; see also under University Requirements, on page 93.

Courses in African American and African Studies (AAS)

Lower Division Courses

10. African-American Culture and Society (4)
Lecture—3 hours; discussion—1 hour. Critical examination of the historical, political, social, and economic factors that have affected the development and status of African-American people in contemporary society. GE credit: Div.—I. Harrison

12. Introduction to African Studies (4)
Lecture/discussion—4 hours. Introduction to African Studies which will focus on the various disciplinary perspectives through which African society and culture are generally studied. A survey of methods, resources and conceptual tools for the study of Africa. GE credit: ArtHum, Div, Wrt.—II. (II.) Adejunmobi

15. Introduction to African American Humanities (4)
Lecture—3 hours; discussion—1 hour. Introduction to the humanist tradition developed by writers, philosophers, and artists of African descent in the West. Attention given to African sources, as well as European, Caribbean, Latin-American, and North American variations on this tradition. GE credit: ArtHum, Div, Wrt.—I. (I.) Harrison, Osumare

16. Verbal and Performance Arts in Africa (4)
Lecture/discussion—4 hours. African verbal arts; oral texts from different African cultures. Types of critical response to oral texts, role of oral artists, context and esthetics of oral performance in Africa. GE credit: ArtHum, Div, Wrt.—II. (II.) Adejunmobi

17. Women in African Societies (4)
Lecture/discussion—4 hours. Gender relations in traditional and contemporary African society. Involvement of African women in politics, religion, the economy, the arts. African responses to feminist theory. Images of women in African literature. GE credit: Div, Wrt.—I. (I.) Adejunmobi

18. Introduction to Caribbean Studies (4)
Lecture—3 hours; discussion—1 hour. Introduction to the contemporary culture, peoples, politics, and societies of the Caribbean. Topics include movements of people, goods and ideas across the Atlantic world and creative productions within the Caribbean. Offered in alternate years. GE Credit: Div, SocSci.—II. Ng'weno

50. Black Images in Popular Culture (4)
Lecture—2 hours; discussion—2 hours. A survey of the depictions of Blacks in popular culture (popular press, stage, radio, film, television, advertising) from the middle of the sixteenth century to the present. GE credit: ArtHum, Div, Wrt.—III. (III.) Turner, Acham

51. History of Afro American Dance (4)
Lecture—2 hours; discussion—2 hours. Evolution of African American dance, tracing its history and development from West Africa through the Caribbean and to the United States. Investigates the social relevance of African American dance and the artistic merits and contributions of African American choreographers and performers.—III. (III.) Osumare

52. African Traditional Religion (4)
Lecture—2 hours; discussion—2 hours. Introduction to traditional religions of the sub-Saharan African peoples: emphasis on myths, rituals and symbols in West, East, Central and South African indigenous religions. Examines themes: sacred kingship, divination system, women, prophecy, conversion and adaptation to Islam and Christianity. GE credit: ArtHum, Div, Wrt.—II. (II.) Olupona

80. Introduction to Black Politics (4)
Lecture—4 hours. Introduction to the analysis of Afro-American politics, using conceptual frameworks from political science and other social sciences. GE credit: SocSci, Div, Wrt.—III. (III.) Harrison

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Survey of Ethnicity in the U.S. (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Sociological and historical analysis of the experience, culture, and relations of and between groups considered racial and/or ethnic minorities in the United States. GE credit: ArtHum, Div.—II. Harrison

101. Introduction to Research in the Afro-American Community (4)
Lecture—4 hours. Prerequisite: course 10 or consent of instructor. Introductory survey of Afro-American Studies methods and techniques; problems and methodology in Afro-American Studies.—III. (III.) Harrison

107A. African Descent Communities and Culture in the Caribbean and Latin America (4)
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: upper division standing. Origin and development of African descent communities and culture in the Caribbean and Latin America: (a) the evidence for pre-Columbian arrivals; (b) the African slave trade and its aftermath; (c) the emergence of the African-creole cultures. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(I.) Ng'weno

107B. African Descent Communities and Culture in North America (4)
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: upper division standing. Origin and development of African descent communities and culture in the U.S.A., Canada, and Mexico from the African slave trade to contemporary urban society. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(I.)

107C. African Descent Communities and Culture in Europe and Asia (4)
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: upper division standing. The study of early African kingdoms, their relationship with Europe and Asia, and the development of African descent communities and culture in Europe and Asia from the pre-Columbian to the post-colonial era. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(I.)

110. West African Social Organization (4)
Lecture—4 hours. Prerequisite: course 101 or consent of instructor. Ecology, population, social organization, and survival culture of West Africa in the pre-colonial, colonial, and post-colonial periods. GE credit: SocSci, Div.—II. (II.) Adejunmobi

123. Black Female Experience in Contemporary Society (4)
Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Black female social, intellectual, and psychological development. Black women's contributions in history, literature, and social science; life experiences of Black women and philosophical underpinnings of the feminist movement. GE credit: ArtHum, Div.—III. (III.) Acham

130. Education in the African-American Community (4)
Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 10 or 100, and completion of the Subject A requirement. Examination of the history of the education of African Americans in the United States. Examination and critique of contemporary theories concerning the schooling of African Americans. (Former course 140.)—I. (I.) Turner

131. Ethnicity, Culture, and the Self (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 3. Cultural and social psychological influences on Asian Americans focusing on the individual. GE credit: SocSci, Div.—II, III. (II, III.) Sue, Zane

132. Health Issues Confronting Asian Americans and Pacific Islanders (4)
Lecture/discussion—4 hours. Health issues confronting Asian Americans and Pacific Islanders. (Same course as Public Health Sciences 132.)—II. (II.) Chen

133. The Black Family in America (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Analysis of social science research to examine relationship between black (African-descent) family structures, patterns of functioning, and political, economic, and social conditions in the U.S. Offered in alternate years. GE credit: SocSci, Div.—III, IV. (III, IV.) Harrison

141. Asian Americans and the Political Culture of Fashion in the U.S. and Asia (4)
Lecture/discussion—4 hours; term paper; project. Prerequisite: course1; course 2, 3, or 4 or consent of instructor. Historical, cultural and sociopolitical development of fashion in Asia and the U.S. as it relates to the Asian Diasporas. Specific aspects of material culture: textiles, clothing and fashion. Offered in alternate years. GE credit: ArtHum or SocSci, Div.—(III.) Kieu Linh Valverde

145A. Black Social and Political Thought (4)
Lecture—4 hours. Prerequisite: course 10 or 80, or consent of instructor. Exploration and analysis of Black social and political thought in the Americas. GE credit: SocSci, Div.—III. (III.) Harrison, Osumare

145B. Black Intellectuals (4)
Lecture—4 hours. Prerequisite: course 10, 80, 145A, or consent of instructor. Exposition and critical analysis of selected theoretical writings of Black intellectuals, and especially political and social thinkers, in the Americas. GE credit: SocSci, Div.—III. (III.) Harrison, Ng'weno

150A. Afro-American Visual Arts Tradition: A Historical and Cultural Study (4)
Lecture—4 hours. Prerequisite: upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from 1600 through Reconstruction. GE credit: ArtHum, Div.—I. (I.)

150B. Afro-American Visual Arts Tradition: A Historical and Cultural Study (4)
Lecture—4 hours. Prerequisite: upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from Reconstruction to the present. GE credit: ArtHum, Div.—II. (II.)

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

152. Major Voices in Black World Literature (4)
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: upper division standing, completion of course 15 or comparable course in literature or the humanities. The recurrence of cultural tropes in the works of major black world authors and formation of an African-oriented canon. Principal activities include critical reading and discovery of literature as a cultural resource. GE credit: ArtHum, Div, Wrt.—II. (II.) Adejunmobi

154. University Gospel Choir (2)
Rehearsal—4 hours. Prerequisite: consent of instructor; open to any student in the University. Rehearsal, study, and performance of Gospel music. May be repeated for credit. (Same course as Music 154.) (P/NP grading only.)—I, II, III. (I, II, III.) Lymos,

155A. African-American Dance and Culture in the United States, Brazil and the Caribbean (4)
Lecture/discussion—4 hours. A comparative study of the African American dance forms in the U.S.A., Brazil, Haiti, Cuba, Jamaica, Barbados, and Trinidad. Examination of ritual, folk, and popular dance forms and the socio/historical factors that have influenced these forms. (Same course as Dramatic Art 155A.)—II. (II.) Osumare

156. Language and Identity in Africa and the African Diaspora (4)
Lecture/discussion—4 hours. Prerequisite: upper division standing or course 12. Relationship between language and identity in literature from Africa and the African Diaspora. Use of pidgins, Creoles, translation from African languages and impact of language policies. GE credit: Div.—III. (III.) Adejunmobi

157. Literature and Society in South Africa (4)
Lecture/discussion—4 hours. Prerequisite: upper division standing or course 12. Political and social developments in 20th-century South Africa as illustrated by a range of South African writing. Response of different writers to race relations, impact of government policy on types and context of writing. Offered in alternate years. GE credit: Div, Wrt.—(III.) Adejunmobi

160. African-American Folklore (4)
Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 10. Theory and history of African American folklore and folklife, including music, material culture, oral narrative, proverbs, and humor. African and Caribbean cultural influences on New World folk genres will be probed. GE credit: ArtHum, Div.—III. (III.) Turner

162. Islam in Africa and the Americas (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course in African American or Religious Studies, preferably course 12 or 110 or Religious Studies 60. A comparative and historical survey of Islam in the regional and cultural settings of Sub-Saharan Africa and the Americas. GE credit: ArtHum, Div, Wrt.—III. (III.)

163. African Religions in the Americas (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: course 10; course 15 or consent of instructor. Comparative study of African religious heritage in the Americas: Jamaica, Trinidad, Cuba, U.S.A., Haiti, and Brazil. Emphasis on the origins and development of Candomble, Santeria, Shango, Vodun, and Rastafarianism in the New World. (Former course 153.) GE credit: ArtHum, Div, Wrt.—III. (III.)

165. Afro-Christianity and the Black Church (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10, 15 or consent of instructor, upper division standing. Examination of the historical role of Christian belief and practice as well as the institution of the Black Church in the experience of African Americans, from slavery to the present. Offered in alternate years. GE credit—SocSci, Div.—II. Harrison

168. Black Documentary: Theory and Practice (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Humanities 10, course 170 and consent of instructor; course 50 recommended. Preference given to African American and African Studies majors and minors. A study of Black documentary history and understanding of the use of the documentary form for political purposes. A discussion of documentary theory. Each student, singly or in a team, will create and carefully edit a documentary project. Offered in alternate years. GE credit: ArtHum, Div.—III. Acham

169. History of African-American Television (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 50 recommended. History of the representation of African Americans in television; how the representations reflect social and political forces in

American society. Role of African Americans in actively shaping their representation. GE credit: ArtHum, Div.—II. Acham

170. African-American Film and Video (4)
Lecture/discussion—2 hours; term paper; film viewing—2 hours. Prerequisite: one of courses 15, 50, or English 160, or 162. A comparative approach in the study of fictional film and video produced and directed by African Americans, drawing on the social sciences and black feminist theory to examine and discuss selected works. GE credit: ArtHum, Div, Wrt.—II. (II.) Acham

172. Diaspora and New Black Identities (4)
Lecture/discussion—3 hours; term paper. Critical analysis about what it means to be Black/African American in the United States today. Topics include old and new diasporas, national origin, language, religion, class, education, politics, identity and cultural heritage. GE credit: Div, Wrt.—II. (II.) Ng'weno

175A. Black Documentary: History and Theory (4)
Lecture/discussion—4 hours. Prerequisite: Film Studies 1, course 170; course 50 recommended. Black documentary history and documentary theory. Use of black documentary for political purposes. GE Credit: ArtHum, Div, Wrt.—II, III. Acham

175B. Black Documentary Practicum (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 175A and consent of instructor. Creation of documentary projects, with students working in production crews. Offered in alternate years.—II, III. Acham

176. The Politics of Resources (4)
Lecture/discussion—4 hours. Prerequisite: course 12 or 110. Restricted to 50 students. Examination of the ways in which the processes of the extraction, purification and use of natural resources and the complex regimes of valuation and commodification they (re)produce lead to cooperation and conflict in contemporary Africa and beyond.—III. (III.) Adebanwi

180. Race and Ethnicity in Latin America (4)
Lecture—4 hours. The social and political effects of racial and ethnic categorization in Latin America, including issues of economic production, citizenship, national belonging, and access to resources. Emphasis is on peoples of African, Indigenous, and Asian descent. GE credit: ArtHum or SocSci, Div.—II. (II.) Ng'weno

181. Hip Hop in Urban America (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: junior- or senior-level standing or consent of instructor. History, aesthetics, urban context, and economics of hip-hop in the US, and its globalization. Hip-hop's four artistic elements-rap, deejaying, breakdance, and aerosol art-allow the examination of issues of race, ethnicity, and gender in youth culture and American society. GE Credit: ArtHum, Div.—III. (III.) Osumare

185. Topics in African-American Film (4)
Lecture/discussion—4 hours. Prerequisite: course 170; course 50 recommended. Intensive study of special topics in African American film. May be repeated one time for credit. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—II. (II.) Acham

190. Topics in African and African-Diaspora Studies (4)
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing in African American and African Studies or consent of instructor. Intensive treatment of a special topic or problem in African or African Diaspora Studies. May be repeated one time for credit when topic differs.—III. (III.)

192. Internship in African-American and African Studies (1-8)
Internship—3-24 hours. Prerequisite: upper division standing, completion of 12 units of upper division study in African American and African Studies courses and consent of instructor. Enrollment limited to African American and African Studies majors and minors. Supervised internship in community, government, or private institutions, in all subject areas offered by the African American and African Studies Program. May be repeated for credit for a total of 12 units. (P/NP grading only.)

197T. Tutoring in Afro-American Studies (1-5)
Tutoring—1-5 hours. Prerequisite: consent of major committee; upper division standing with major in Afro-American Studies. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit for a total of six units. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201. Critical Foundations in African American Studies (4)
Seminar—3 hours. Prerequisite: graduate standing. Introduction to history of African American Studies. Topics include: research agendas, policy implications, debates, crises, and institutional frameworks. Offered in alternate years.—(I.) Acham, Harrison

202. Critical Foundations in African Studies (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Introduces students to the history and current organization of African Studies as area of intellectual investigation. Offers students an opportunity to review research agenda and policy implications, debates, crises, and institutional frameworks surrounding the production of knowledge about Africa. Offered in alternate years.—III. Adejunmobi

203. Critical Foundations in African Diaspora Studies (4)
Seminar—3 hours; term paper. Integrative conceptual framework includes History, Geography, Political Economy, Culture, Aesthetics as tools to investigate the African Diaspora. Students engage African Diaspora theories within their research projects understanding issues developing from the movement of Africans to the rest of the world.—III. (II.) Ng'weno, Osumare

204. Methodologies in African American and African Studies (4)
Seminar—3 hours; term paper. The relationship between theory and methodology, with emphasis on identifying relevant methodological approaches and constructing theoretically informed research projects for studying the experience of people of African descent whether on the African continent or in the rest of the world.—I. Harrison, Ngweno

298A. Directed Group Study in African American and African Diaspora Studies (1-5)
Prerequisite: graduate standing. May be repeated for credit up to three times. (S/U grading only.)

298B. Directed Group Study in African Studies (1-5)
May be repeated for credit up to three times. (S/U grading only.)

299. Directed Group Study in African Studies (1-12)
(S/U grading only.)

Agricultural and Environmental Chemistry (A Graduate Group)

Susan E. Ebeler, Ph.D., Chairperson of the Group

Group Office. 4117 Meyer Hall (530) 752-1415; *http://agchem.ucdavis.edu/*

Faculty

Douglas O. Adams, Ph.D., Associate Professor *(Viticulture and Enology)*
Cort Anastasio, Ph.D., Professor *(Land, Air and Water Resources)*
Deborah Bennett, Ph.D., Assistant Adjunct Professor *(Public Health Sciences, School of Medicine)*
Linda F. Bisson, Ph.D., Professor *(Viticulture and Enology)*
Roger B. Boulton, Ph.D., Professor *(Viticulture and Enology)*
William H. Casey, Ph.D., Professor *(Chemistry)*
Victor P. Claassen, Ph.D., Assistant Researcher *(Land, Air and Water Resources)*
Andrew J. Clifford, Ph.D., Professor *(Nutrition)*
Anthony Cornel, Ph.D., Lecturer *(Entomology)*
Carroll E. Cross, M.D., Professor *(Internal Medicine)*
Randy Dahlgren, Ph.D., Professor *(Land, Air and Water Resources) Academic Senate Distinguished Teaching Award*
Susan E. Ebeler, Ph.D., Professor *(Viticulture and Enology)*
Ian C. Faloona, Ph.D., Assistant Professor *(Land, Air and Water Resources)*
Oliver Fiehn, Ph.D., Associate Professor *(Molecular and Cell Biology)*
Edwin N. Frankel, Ph.D., Adjunct Professor *(Food Science and Technology)*
Nilesh W. Gaikwad, Ph.D., Assistant Professor *(Nutrition)*
J. Bruce German, Ph.D., Professor *(Food Science and Technology)*
Peter G. Green, Ph.D., Lecturer *(Civil and Environmental Engineering)*
Bruce D. Hammock, Ph.D., Professor *(Entomology) Academic Senate Distinguished Teaching Award*
Matt Hengel, Ph.D., Assistant Adjunct Professor *(Environmental Toxicology)*
Hildegarde Heymann, Ph.D., Professor *(Viticulture and Enology)*
Dirk M. Holstege, Ph.D., Assistant Adjunct Professor *(Environmental Toxicology)*
William R. Horwath, Ph.D., Professor *(Land, Air and Water Resources)*
Krassimira R. Hristova, Ph.D., Research Professor *(Land, Air and Water Resources)*
You-Lo Hsieh, Ph.D., Professor *(Textiles and Clothing)*
Norman Y. Kado, Ph.D., Associate Adjunct Professor *(Environmental Toxicology)*
Peter B. Kelly, Ph.D., Professor *(Chemistry)*
Annie J. King, Ph.D., Professor *(Animal Science)*
Michael J. Kleeman, Ph.D., Associate Professor *(Civil and Environmental Engineering)*
John Knezovich, Ph.D., Adjunct Professor *(Environmental Toxicology)*
Fumio Matsumura, Ph.D., Professor *(Environmental Toxicology)*
Walter S. Leal, Ph.D., Professor *(Entomology)*
Michael J. McCarthy, Ph.D., Professor *(Food Science and Technology)*
Alyson E. Mitchell, Ph.D., Associate Professor *(Food Science and Technology)*
Krishnan P. Nambiar, Associate Professor *(Chemistry) Distinguished Graduate Mentoring Award*
John Newman, Ph.D., Adjunct Professor *(Nutrition)*
Sanjai J. Parikh, Ph.D., Assistant Professor *(Land, Air and Water Resources)*

James R. Sanborn, Ph.D., Researcher
(Entomology/Pesticide Regulation)
Neil E. Schore, Ph.D., Professor *(Chemistry)*
Kate Scow, Ph.D., Professor
(Land, Air and Water Resources)
James N. Seiber, Ph.D., Professor
(Food Science and Technology)
Takayuki Shibamoto, Ph.D., Professor
(Environmental Toxicology)
Charles F. Shoemaker, Ph.D., Professor
(Food Science and Technology)
Gary M. Smith, Ph.D., Professor
(Food Science and Technology)
Randal J. Southard, Ph.D., Professor
(Land, Air and Water Resources)
Gang Sun, Ph.D., Professor
(Textiles and Clothing)
Swee Teh, Ph.D., Associate Researcher
(Anatomy/Physiology/Cell Biology: VM)
Ronald S. Tjeerdema, Ph.D., Professor
(Environmental Toxicology)
Dean J. Tantillo, Ph.D., Assistant Professor
(Chemistry)
Jean VanderGheynst, Ph.D., Associate Professor
(Biological and Agricultural Engineering)
Andrew L. Waterhouse, Ph.D., Professor
(Viticulture and Enology)
Matthew J. Wood, Ph.D., Assistant Professor
(Environmental Toxicology)
Thomas M. Young, Ph.D., Professor
(Civil and Environmental Engineering)
Qi Zhang, Ph.D., Assistant Professor
(Environmental Toxicology)

Emeriti Faculty

Donald G. Crosby, Ph.D., Professor Emeritus
(Environmental Toxicology)
David S. Reid, Ph.D., Professor Emeritus
(Food Science and Technology)
John R. Whitaker, Ph.D., Professor Emeritus
(Food Science and Technology)
Robert J. Zasoski, Ph.D., Professor Emeritus
(Land, Air and Water Resources)

Affiliated Faculty

Lowell L. Ashbaugh, Ph.D., Associate Researcher
(Crocker Nuclear Lab)
Diane M. Barrett, Ph.D., Specialist
(Food Science and Technology)
Thomas Harter, Ph.D., Specialist in Cooperative Extension *(Land, Air and Water Resources)*
Warren H. White, Ph.D., Researcher
(Crocker Nuclear Lab)

Graduate Study. The Graduate Group in Agricultural and Environmental Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees. Study relates to the chemical and biochemical aspects of foods, wine, fibers/polymers, pesticides, and environmental pollution. Detailed information regarding graduate study may be obtained at *http://agchem.ucdavis.edu/*.

Graduate Advisers. D.O. Adams *(Viticulture and Enology)*, Y.-L. Hsieh *(Textiles and Clothing)*, A.E. Mitchell *(Food Science and Technology)*, T. Shibamoto *(Environmental Toxicology)*, T. Young *(Civil and Environmental Engineering)*

Courses in Agricultural and Environmental Chemistry (AGC)

Graduate Courses

290. Seminar (1)
Seminar—1 hour. Selected topics in agricultural and environmental chemistry, presented by students. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
Prerequisite: consent of instructor. The chemistry and biochemistry of foods, nutritional chemicals, pesticides, and other special topics as they apply to agricultural and environmental chemistry.

299. Research (1-12)
Arrangements should be made well in advance with a faculty member of the Group in Agricultural and Environmental Chemistry. (S/U grading only.)

Agricultural Computing and Information Systems

See Applied Computing and Information Systems, on page 161.

Agricultural and Environmental Education

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

The Major Program

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

The Program

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

Career Alternatives

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

B.S. Major Requirements (AEE):

UNITS

Government/U.S. Constitution 4
History 17A or Political Science 1 4

Preparatory Subject Matter 50

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

Animal Science 1, 2, 21, 41 8
Applied Biological Systems Technology 16, 52, 49, 101 9
Economics 15 and either Economics 1A or 1B 8
Environmental Horticulture 1, 6, Plant Sciences 5 9
Environmental Science and Policy 10 and 10D; Environmental Toxicology 10, Hydrologic Science 10, 47 8
Plant Sciences 1, 2, 15, 49; Viticulture and Enology 2, 3 8

Science/Math Preparatory 42-44
Biological Sciences 2A & 2B 9
Chemistry 2A & 2B 10
Earth Science 1, 20, SSC 10 9
Mathematics 16A &16B, or 17A&B, or 21A&B 6-8
Physics 7A & 7B 8

Depth Subject Matter 21
Agricultural Education 100 3
International Agricultural Development 103 4
Education 110, 115, 142 10
Environmental Science and Policy 110 4

Focused Depth Subject Matter 16

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

Agricultural Business and Economics. Agricultural and Resource Economics 100A, 100B, 120, 130, 135, 138, 140, 150, 175, 176
Animal Science. Select upper division units from any Animal Genetics, Animal Science, Avian Sciences course or Animal Biology 102; Food Science and Technology 109; Nature and Culture 140; Neurobiology, Physiology, and Behavior 101, 121; Nutrition 115, 122, 123
Applied Biological Systems Technology. Applied Biological Systems Technology 121, 142, 161, 165, 175, 180, 182
Environmental Horticulture. Environmental Horticulture 102, 105, 120, 129, 125, 133, 160; Nature and Culture 120, Plant Sciences 150
Environmental Science and Natural Resources. Environmental and Resource Sciences 121, 131; Environmental Science and Policy 100, 101, 110, 116, 123, 151, 161, 170, EVE 101, 115, 134; Plant Sciences 101, 105, 110A; Wildlife, Fish, and Conservation Biology 110, 111, 120, 154
Plant and Soil Science. Plant Biology 102, 105, 116, 117, 160, 172, 176; Plant Sciences 150; Soil Science 100, 102, 118; Viticulture and Enology 101A, 101C

Restricted Electives 16

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

Total Units For Major 149-151

Master Adviser. Cary J. Trexler, Associate Professor

Major Advisers. Heidi Ballard, Assistant Professor of Environmental Education; Lynn Martindale, Lecturer/Supervisor School of Education; Cary J. Trexler, Associate Professor

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

Courses in Agricultural Education (AED)

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

Lower Division Courses

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Concepts in Agricultural and Environmental Education (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing. Philosophy and nature of formal and non-formal agricultural and environmental education programs. Emphasis on understanding the role of the teacher and observing a variety of programs. GE credit: SocSci, Wrt.—II. (II.) Martindale

160. Vocational Education (3)
Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture commerce, home economics, and industry. GE credit: SocSci, Wrt.—II. (II.)

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

172. Multimedia Productions (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171 recommended. Design and production of educational, technical, and professional multimedia presentations. Instructional or professional presentations using a variety of media, including slides, video, transparencies, and computer-generated graphics. Offered in alternate years. GE credit: SocSci, Wrt.

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

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: upper division standing; consent of instructor. Supervised internship off and on campus in areas of agricultural education. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Professional Courses

300. Directed Field Experience in Teaching (2)
Discussion—1 hour; field experience—3 hours. Prerequisite: course 100. Experience as teaching assistant in agriculture or home economics programs in public schools. May be repeated one time for credit. (S/U grading only.)

301. Planning for Instructional Programs (3)
Lecture—3 hours. Prerequisite: course 100; course 300 (may be taken concurrently). Major paradigms in program planning and development. Emphasis on key steps in curriculum development, including selection and organization of educational objectives, learning experiences and teaching materials and resources.—III. (III.) Trexler

302. Teaching Methods in Agricultural Education (3)
Lecture—2 hours; laboratory—2 hours. Prerequisite: course 100, course 300 (may be taken concurrently). Development of teaching strategies with special emphasis on the designing of learning experiences, instructional execution, and use of teaching aids in agricultural education.

306A. Field Experience with Future Farmers of America and Supervised Experience Programs (4)
Lecture/discussion—2 hours; field work—6 hours. Prerequisite: acceptance into a teacher education program; course 306B (concurrently). Develop an understanding of the Future Farmers of America and supervised occupational experience programs through planning, conducting, and evaluating actual programs.

306B. Field Experience in Teaching Agriculture (5-18)
Student teaching (corresponds with public school session). Prerequisite: acceptance into a teacher education program; course 306A (concurrently); courses 100, 300, 301, 302. Directed teaching including supervision of occupational experience programs and youth activities in secondary schools or community colleges. May be repeated for credit up to a maximum of 18 units.

323. Resource Development: Agricultural Education (3)
Lecture—3 hours. Prerequisite: courses 306A, 306B. Selection and implementation of community resources in teaching.

390. Seminar: Issues in Agricultural Education (2)
Discussion/laboratory—4 hours. Prerequisite: acceptance into a teacher education program and courses 306A-306B. Discussion and evaluation of current issues, theories and research in agricultural education. (S/U grading only.)

Agricultural Management and Rangeland Resources

(College of Agricultural and Environmental Sciences)

This major was discontinued as of Fall 2008; see Ecological Management and Restoration, on page 218.

Faculty. See Plant Sciences, on page 461.

Courses. See Plant Sciences, on page 461.

Agricultural and Managerial Economics

See Managerial Economics, on page 372.

Agricultural and Resource Economics

(College of Agricultural and Environmental Sciences)

Richard E. Howitt, Ph.D., Chair of the Department

Department Office. 2116 Social Sciences and Humanities Building (530) 752-1517

Undergraduate Student Information, 1176 Social Sciences and Humanities Building (530) 754-9536; *http://www.agecon.ucdavis.edu*

Graduate Student Information, 1171 Social Sciences and Humanities Building (530) 752-6185; *http://www.agecon.ucdavis.edu*

Faculty

Julian M. Alston, Ph.D., Professor
Stephen R. Boucher, Ph.D., Associate Professor
Colin A. Carter, Ph.D., Professor
Michael R. Carter, Ph.D., Professor
James A. Chalfant, Ph.D., Professor
Y. Hossein Farzin, Ph.D., Professor
Rachael E. Goodhue, Ph.D., Associate Professor
Richard D. Green, Ph.D., Professor
Arthur M. Havenner, Ph.D., Professor
Richard E. Howitt, Ph.D., Professor
Lovell S. Jarvis, Ph.D., Professor
Katrina K. Jessoe, Ph.D., Assistant Professor
Douglas M. Larson, Ph.D., Professor
C.-Y. Cynthia Lin, Ph.D., Assistant Professor
Travis J. Lybbert, Ph.D., Assistant Professor
Philip L. Martin, Ph.D., Professor
Pierre R. Mérel, Ph.D., Assistant Professor
Catherine J. Morrison Paul, Ph.D., Professor
Quirino Paris, Ph.D., Professor
Richard J. Sexton, Ph.D., Professor
Aaron D. Smith, Ph.D., Associate Professor
Daniel A. Sumner, Ph.D., Professor
J. Edward Taylor, Ph.D., Professor
James E. Wilen, Ph.D., Professor

Emeriti Faculty

Oscar R. Burt, Ph.D., Professor Emeritus
Hoy F. Carman, Ph.D., Professor Emeritus
Harold O. Carter, Ph.D., Professor Emeritus
Benjamin C. French, Ph.D., Professor Emeritus
B. Delworth Gardner, Ph.D., Professor Emeritus
Dale M. Heien, Ph.D., Professor Emeritus
Warren E. Johnston, Ph.D., Professor Emeritus
Gordon A. King, Ph.D., Professor Emeritus
Sylvia Lane, Ph.D., Professor Emerita
Elmer W. Learn, Ph.D., Professor Emeritus
Samuel H. Logan, Ph.D., Professor Emeritus
Alexander F. McCalla, Ph.D., Professor Emeritus
Chester O. McCorkle, Jr., Ph.D., Professor Emeritus
Refugio I. Rochin, Ph.D., Professor Emeritus
Lawrence E. Shepard, Ph.D., Senior Lecturer SOE Emeritus
Stephen H. Sosnick, Ph.D., Professor Emeritus

Affiliated Faculty

Steven C. Blank, Ph.D., Specialist in Cooperative Extension
Leslie J. Butler, Ph.D., Specialist in Cooperative Extension
John H. Constantine, Ph.D., Lecturer
Roberta L. Cook, Ph.D., Specialist in Cooperative Extension
Shermain D. Hardesty, Ph.D., Specialist in Cooperative Extension
Karen Klonsky, Ph.D., Specialist in Cooperative Extension
Gerald T. Lundblad, M.B.A., Lecturer
Ralph Pavey, B.S., Lecturer
Stephen A. Vosti, Ph.D., Associate Adjunct Professor
Marilyn D. Whitney, Ph.D., Lecturer

Major Program and Graduate Study. See the major in Managerial Economics, on page 372; and for graduate study, see Graduate Studies, on page 109.

Major Advisers. Contact the Department office.

Related Courses. See Environmental Biology and Management 110; Environmental Science and Policy 160, 168A, 168B, 173; and courses in Economics.

Courses in Agricultural and Resource Economics (ARE)

Lower Division Courses

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

1S. Economic Basis of the Agricultural Industry (4)
Lecture—4 hours. Agriculture and man; the agricultural industry in Australia and world economies; production and supply, marketing and demand; agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy emphasizing Australia. Taught in Australia under the supervision of a UC Davis faculty member. Not open for credit to students who have completed course 1.—Alston

15. Population, Environment and World Agriculture (4)
Lecture—3 hours; discussion—1 hour. Economic analysis of interactions among population, environment, natural resources and development of world agriculture. Introduces students to economic thinking about population growth, its causes and consequences for world food demand, and environmental and technological limits to increasing food supplies. GE credit: Div, SocSci, Wrt.—III. (III.)

18. Business Law (4)
Lecture—4 hours. Prerequisite: sophomore standing. General principles of business law in the areas of contracts, business organization, real property, uniform commercial code, sales, commercial paper, employment relations, and creditor-debtor against a background of the history and functioning of our present legal system.—I, II, III. (I, II, III.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100A. Intermediate Microeconomics: Theory of Production and Consumption (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A, 1B; Mathematics 16B. Theory of individual consumer and market demand; theory of production and supply of agricultural products, with particular reference to the individual firm; pricing, output determination, and employment of resources under pure competition. (Not open for credit to students who have completed Economics 100 or the equivalent; however, Economics 100 will not serve as prerequisite to course 100B.)—I, II, III. (I, II, III.)

100B. Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. Pricing, output determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition.—I, II, III. (I, II, III.)

106. Quantitative Methods in Agricultural Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A, Statistics 103. Statistical methods for analyzing quantitative agricultural economics data: linear and multiple correlation and regression analysis.—I, II, III. (I, II, III.)

112. Fundamentals of Business Organization (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: upper division standing or consent of instructor. The role of organizational design and behavior in business and public agencies. Principles of planning, decision making; individual behavior, motivation, leadership; informal groups; conflict and change in the organization.—I, III. (I, III.)

113. Fundamentals of Marketing Management (4)
Lecture—4 hours. Prerequisite: Economics 1A. For non-majors only. Nature of product marketing by the business firm. Customer-product relationships, pricing and demand; new product development and marketing strategy; promotion and advertising; product life cycles; the distribution system; manufacturing, wholesaling, retailing. Government regulation and restraints. (Not open for credit to students who have completed course 136.)

115A. Economic Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A and 1B. Major issues encountered in emerging from international poverty, problems of growth and structural change, human welfare, population growth and health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization. (Same course as Economics 115A.) GE credit: Div, SocSci.—I, II, III. (I, II, III.)

115B. Economic Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A and 1B. Macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. (Same course as Economics 115B.) GE credit: SocSci.—II, III. (II, III.)

118. Tax Accounting (4)
Lecture—4 hours. Prerequisite: Management 11A, 11B; course 18 recommended. Development and application of a framework to understand the tax effects of typical management decisions on both entities and their owners. Impacts that different methods of taxation have on business entities with emphasis on tax planning, using income and deduction strategies, retirement plans, and choice of business entity for tax minimization.

120. Agricultural Policy (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A or the equivalent. Analytical treatment of historical and current economic problems and governmental policies influencing American agriculture. Uses of economic theory to develop historical and conceptual understanding of the economics of agriculture; how public policy influences the nature and performance of American agriculture. GE credit: SocSci.—III. (III.) Alston

120S. Agricultural Policy (4)
Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Analytical treatment of historical and current economic problems and governmental policies influencing agriculture. Uses of economic theory to develop historical and conceptual understanding of the economics of agriculture; how public policy influences the nature and performance of agriculture. Taught in Australia under the supervision of a UC Davis faculty member. Not open for credit to students who have completed course 120.—Alston

121. Economics of Agricultural Sustainability (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Sciences 15; Community and Regional Development 20; Economics 1A; Mathematics 12 or equivalent. Application of economic concepts to agro-environmental issues relevant to agricultural sustainability. Topics include market efficiency, production externalities, government policies, agricultural trade, product differentiation, all linked to sustainability issues. Case studies include biofuels, genetically modified foods and geographically differentiated products.—III. (III.) Mérel

130. Agricultural Markets (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. The nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing.—II. (II.)

132. Cooperative Business Enterprises (3)
Lecture—3 hours. Prerequisite: Economics 1A. Study of cooperative business enterprise in the United States and elsewhere; economic theories of behavior, principles of operation, finance, decision-making, and taxation.

135. Agribusiness Marketing Plan Development (2)
Lecture/discussion—2 hours. Prerequisite: upper division standing. Fundamental components required to develop a marketing plan. Appreciation of the concept of a marketing plan, appropriate research required, including the use of library and Internet, survey and interview instruments, government documents, market analysis, business proposition, action planning, financial evaluation and monitoring. (P/NP grading only.)

136. Managerial Marketing (4)
Lecture—4 hours. Prerequisite: course 100A; Statistics 103. Application of economic theory and statistics in the study of marketing. Marketing measurement and forecasting, market planning, market segmentation, determination of optimal product market mix, sales and cost analysis, conduct of marketing research, marketing models and systems.—II, III. (II, III.)

138. International Commodity and Resource Markets (3)
Lecture—3 hours. Prerequisite: course 100A, Economics 100 or 104. Basic nature and scope of international trade in agricultural commodities, agricultural inputs, and natural resources. Market dimensions and policy institutions. Case studies to illustrate import and export problems associated with different regions and commodities.—II. (II.)

139. Futures and Options Markets (3)
Lecture—3 hours. Prerequisite: course 100A; Statistics 103. History, mechanics, and economic functions of futures and options markets; hedging; theory of inter-temporal price formation and behavior of futures and options prices; price forecasting; futures and options as policy tools.—I, III. (I, III.) C. Carter, Williams

140. Farm Management (5)
Lecture—5 hours. Prerequisite: Economics 1A. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business.

142. Personal Finance (3)
Lecture—3 hours. Prerequisite: Economics 1B. Management of income and expenditures by the household. Use of consumer credit, savings, and insurance by households. Principles of tax, retirement, and estate planning.—I, II, III. (I, II, III.)

143. Investments (3)
Lecture—3 hours. Prerequisite: course 142 or consent of instructor. Survey of investment institutions, sources of investment information, and portfolio theory. Analysis of the stock, bond and real estate markets from the perspective of the investor.—II. (II.)

144. Real Estate Economics (3)
Lecture—3 hours. Prerequisite: course 100A. The economic theory, analysis, and institutions of real estate markets and related financial markets. Case studies drawn from the raw land, single family, multifamily, industrial and office real estate markets.—III. (III.)

145. Farm and Rural Resources Appraisal (4)
Lecture/discussion—4 hours. Principles, procedures, and practice of the valuation process with specific emphasis placed on farm real estate. Concepts of value, description of land, identification of the major physical and economic determinants of

value, the three primary appraisal approaches to valuation, discussion of appraisal activity and practice.—II. (II.)

146. Government Regulation of Business (3)
Lecture—3 hours. Prerequisite: course 100A or the equivalent. Variety, nature and impact of government regulation: anti-trust laws and economic and social regulation. Nature of the legislative process, promulgation of regulations, and their impact, especially as analyzed by economists. GE credit: SocSci.—III. (III.)

147. Resource and Environmental Policy Analysis (3)
Lecture—3 hours. Prerequisite: Economics 1A; enrollment open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public issues. (Students who have had or are taking course 100A, Economics 100, or the equivalent, may receive only 2 units of credit, so must enroll in course 147M instead.) GE credit: SocSci.

147M. Resource and Environmental Policy Analysis (2)
Lecture—3 hours. Prerequisite: Economics 1A; enrollment open to non-majors only. Natural resource use problems with emphasis on past and current policies and institutions affecting resource use; determinants, principles, and patterns of natural resource use; property rights; conservation; private and public resource use problems; and public issues. (Students who have had or are taking course 100A, Economics 100, or the equivalent, must enroll in this course (for 2 units) rather than course 147.)

150. Agricultural Labor (4)
Lecture—3 hours; discussion—1 hour. Importance of family and hired labor in agriculture; farm labor market; unions and collective bargaining in California agriculture; simulated collective bargaining exercise; effects of unions on farm wages and earnings. GE credit: SocSci, Div, Wrt.—I. (I.) Martin

155. Quantitative Analysis for Business Decisions (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A; Statistics 103. Introduction to selected topics in management science and operations research: decision analysis for management, mathematical programming, competitive analysis, and others.—I, II, III. (I, II, III.)

156. Introduction to Mathematical Economics (4)
Lecture—4 hours. Prerequisite: courses 100A and 155; Mathematics 16C or 21C recommended (students should note that the formal mathematical content of this course is higher than other courses in the curriculum). Linear algebra for economists; necessary and sufficient conditions in static optimization problems; implicit function theorem; economic methodology and mathematics; comparative statics; envelope theorem; Le Chatelier principle; applications to production and consumer models.—I. (I.)

157. Analysis for Production Management (4)
Lecture—4 hours. Prerequisite: course 100A; Statistics 103. Application of economic theory and quantitative methods in analyzing production management problems including inventory control, production scheduling, quality control, simulation, systems approach, and work measurement.—I, II, III. (I, II, III.)

171A. Financial Management of the Firm (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 106; Management 11A-11B. Financial analysis at the firm level: methods of depreciation; influence of the tax structure; inventory, cash, and accounts receivable management; sources of short-term and long-term financing, and financial problem solving using a computer spreadsheet program. Not open for credit to students who have completed Economics 134.—I, II. (I, II.)

171B. Financial Management of the Firm (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 171A. Financial analysis at the firm level: methods of capital budgeting; calculating the cost of capital; dividend policies; mergers and acquisitions; and special current topics in finance.—II, III. (II, III.) Smith

175. Natural Resource Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B or Economics 100 or the equivalent. Economic concepts and policy issues associated with natural resources, renewable resources, (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (Same course as Environmental Science and Policy 175.) GE Credit: SocSci.—III. (III.) Lin

176. Environmental Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B or Economics 100. Role of the environment in economic activity and methods for protecting and enhancing environmental quality; implications of market failures for public policy; design of environmental policy; theory of welfare measurement; measuring the benefits of environmental improvement. GE credit: SocSci.—I. (I.) Farzin, Larson

190. Topics in Agricultural and Resource Economics (3)
Lecture—3 hours. Prerequisite: passing grades in course 100A and Statistics 103; consent of instructor. Selected topics in agricultural and resource economics, focusing on current research. May be repeated four times for credit when topic differs. Not offered every year.

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

194HA-194HB. Special Study for Honors Students (4-4)
Independent Study—3 hours; seminar—1 hour. Prerequisite: Minimum GPA of 3.500; course 100B; courses 106 and 155 (may be taken concurrently); major in Agricultural and Managerial Economics or Managerial Economics; senior standing. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of sequence.)—I, II. (I, II.)

197T. Tutoring in Agricultural Economics (1-3)
Hours and duties will vary depending upon the course being tutored. Prerequisite: senior standing in Agricultural and Resource Economics and consent of Department Chairperson. Tutor will lead small discussion groups affiliated with one of the department's regular courses, under the supervision of, and at the option of the instructor in charge of the course. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200A. Microeconomic Theory (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (Same course as Economics 200A.)—I. (I.)

200B. Microeconomic Theory (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failures. (Same course as Economics 200B.)—II. (II.)

200C. Microeconomic Theory (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200B. Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (Same course as Economics 200C.)—III. (III.)

202A. Introduction to Applied Research Methods (3)
Lecture/discussion—3 hours. Prerequisite: courses 204A and 256, or the equivalent; course 200A concurrently. Study of philosophy and methodology of applied research in agricultural economics. Methods of conceptualization of researchable topics. Method of communication and constructive criticism.—I. (I.)

202B. Applied Microeconomics I: Consumer and Producer Behavior (3)
Lecture/discussion—3 hours. Prerequisite: courses 200A and 202A; course 200B concurrently. Application of consumer and producer theory in models of individual behavior and market-level phenomena. Implications of consumer and producer theory for specification of empirical models of supply and demand for inputs and outputs and market equilibrium displacement models.—II. (II.)

202C. Applied Microeconomics II: Welfare Analysis and Imperfect Competition (3)
Lecture/discussion—3 hours. Prerequisite: course 202B; course 200C concurrently. Methods of applied welfare economics with emphasis on problems arising in agriculture and the environment. Models of imperfectly competitive markets and their application to industries and institutions in the agricultural sector.—III. (III.)

204A. Microeconomic Analysis I (4)
Lecture—4 hours. Prerequisite: course 100B or Economics 100; advanced undergraduates with consent of instructor. Behavior of consumers and producers and their interactions; tools and methods needed to analyze economic behavior in the marketplace. Application of those methods to real-world problems.—I. (I.) Alston, Morrison Paul

204B. Microeconomic Analysis II (4)
Lecture—4 hours. Prerequisite: course 204A or consent of instructor. Behavior in imperfectly competitive markets-monopoly and price discrimination; oligopoly. Introduction to noncooperative game theory. Analysis of decisions made under risk and uncertainty and imperfect information. The economics of externalities and public goods.—II. (II.) Sexton

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

215A. Microdevelopment Theory and Methods I (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204A; course 240A recommended. Agricultural development theory, with a focus on microeconomics. Agricultural household behavior with and without imperfections and uncertainty. Analysis of rural land, labor, credit and insurance markets, institutions, and contracts. (Same course as Economics 215A.)—I. (I.) Taylor

215B. Open Macroeconomics of Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A or 204A; 200D or 205, and 214 or 215A. Models and policy approaches regarding trade, monetary and fiscal issues, capital flows and debt are discussed in the macroeconomic framework of an open developing country. The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (Same course as Economics 215B.)—II. (II.) Boucher, M. Carter

215C. Microdevelopment Theory and Methods II (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 215A. Extension of development theory and microeconomic methods. Agricultural growth and technological change; poverty and income inequality; multisectoral, including village and regional models. Computable general equilibrium methods and applications. (Same course as Economics 215C.)—III. (III.) Lybbert

215D. Environment and Economic Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 204A or 275. Interdisciplinary course drawing on theoretical and empirical research on interactions between environmental resource use and economic development processes. Analysis of issues emerging at the interface of environmental and development economics. (Same course as Economics 215D.)—Farzin

222. International Agricultural Trade and Policy (3)
Lecture—3 hours. Prerequisite: course 100B or 204A; Economics 160A or the equivalent. Analysis of country interdependence through world agricultural markets. Partial equilibrium analysis is used to study the impacts of national intervention on world markets, national policy choice in an open economy and multinational policy issues.—I. (I.) C. Carter

231. Supply and Demand for Agricultural Products (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A, 202A, and 240A or consent of instructor. Analysis of supply and demand for agricultural commodities emphasizing the effective use of microeconomic theory with econometric methods, and other empirical procedures, in conducting applied analysis of supply and demand at the firm and industry level.—I. (I.) Alston

232. Agricultural Commodity Markets (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A, 202A, and 240A or consent of instructor. Economic analysis of industries that produce, market, transport, store, and process basic commodities. Analysis of market equilibrium under perfect and imperfect competition, with and without government involvement.—II. (II.) Goodhue, Sexton

233. Agricultural Policy (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A, 202A, and 240A or consent of instructor. Nature, formation, evolution, and institutions of economic policy applied to food, agricultural, and rural issues. Examples for detailed consideration include food security, commodity issues, and trade policy. Analytical approaches include static and dynamic welfare analysis, policy design, and political-economic analysis.—III. (III.) C. Carter, Sumner, Williams

239. Econometric Foundations (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in undergraduate-level econometrics. The course will prepare students for econometric theory and empirical work by examining the statistical foundation of econometrics. Special attention is paid to problems specific to non-experimental data common to social sciences. Topics from matrix algebra are also covered. (Same course as Economics 239.)—I. (I.) Chalfant, Green

240A. Econometric Methods (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 133 and a course in linear algebra or the equivalent. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (Same course as Economics 240A.)—II. (II.) Das, Jorda

240B. Econometric Methods (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A. Topics include asymptotic theory and instrumental variables, pooled time-series cross-section estimation, seemingly unrelated regression, classical hypothesis tests, identification and estimation of simultaneous equation models, cointegration, error-correction models, and qualitative and limited dependent variable models. (Same course as Economics 240B.)—III. (III.) Smith

240C. Time Series Econometrics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Probability theory; estimation, inference and forecasting of time series models; trends and non-standard asymptotic theory; vector time series methods and cointegration; time series models for higher order moments and transition data; state-space modeling; the Kalman filter. (Same course as Economics 240C)—II. (II.) Jorda, Kuersteiner, Smith

240D. Cross Section Econometrics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Estimation and inference for nonlinear regression models for cross-section data; models for discrete data and for limited dependent variables; models for panel data; additional topics such as bootstrap and semiparametric regression. (Same course as Economics 240D)—I. (I.) Cameron

240E. Topics in Time Series Econometrics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 240A, 240B and 240C. Modern econometric techniques for time series data. Expand on topics covered in Economics 240A, 240B and 240C. Contents may vary from year to year. (Same course as Economics 240E.)—III. (III.) Jorda

240F. Topics in Cross Section Econometrics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 240A, 240B and 240D. Modern econometrics techniques for cross-section data. Expand on topics covered in Economics 240A, 240B and 240D. Contents may vary from year to year. (Same course as Economics 240F.)—III. (III.) Cameron

252. Applied Linear Programming (4)
Lecture—3 hours; discussion—1 hour. Applied linear programming methods emphasizing uses for business decisions: production, diet, blending, network and related problems.—II. (II.) Paris

253. Optimization Techniques with Economic Applications (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200C. Optimization techniques and methods including linear and nonlinear programming. Empirical applications to household, firm, general equilibrium and economic growth problems.

254. Dynamic Optimization Techniques with Economic Applications (4)
Lecture—4 hours. Prerequisite: course 253 and elementary knowledge of ordinary differential equations. Necessary and sufficient conditions in the calculus of variations and optimal control, economic interpretations, the dynamic envelope theorem and transversality conditions, infinite horizon problems and phase diagrams, local stability and comparative statics of the steady state, comparative dynamics.—II. (I.) Howitt, Wilen

255. Advanced Topics in Economic Dynamics (3)
Lecture—3 hours. Prerequisite: course 254. Local stability analysis, steady state comparative statics and comparative dynamics, dynamic duality theory and the principle of optimality, differential games, numerical solution of deterministic and stochastic dynamic models using GAMS, stochastic optimal control, plus other advanced topics in economic dynamics. Offered in alternate years.

256. Applied Econometrics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 106, Economics 140, or equivalent, or consent of instructor. Application of statistical tools to economic and business analysis. Emphasis on regression analysis, problems of specification, and model development. (Same course as Economics 256.)—I. (I.) Green, Havenner

258. Demand and Market Analysis (3)
Lecture—3 hours. Prerequisite: courses 204A and 256 or consent of instructor. Quantitative and theoretical analysis of the factors affecting supply, demand and price determination for agricultural products. Emphasis on analytical tools for assessing the impacts of changes in government policies and macroeconomic variables.—III. (III.) Lybbert

275. Economic Analysis of Resource and Environmental Policies (4)
Lecture/discussion—4 hours. Prerequisite: course 204A. Development of externality theory, market failure concepts, welfare economics, theory of renewable and non-renewable resource use, and political economic models. Applications to policy issues regarding the agricultural/environment interface and managing resources in the public domain. (Same course as Environmental Science and Policy 275.)—III. (III.) Farzin

276. Environmental Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 204A or consent of instructor. Applications of externality theory to the design of efficient environmental policies. Evaluation of pollution control policy instruments in light of information limitations and market imperfections. Methods for nonmarket valuation of the benefits of environmental improvement.—I. (II.) Lin, Larson

277. Natural Resource Economics (4)
Lecture—4 hours. Prerequisite: course 254 or consent of instructor. Application of capital theory and dynamic methods to issues of optimal use of renewable and nonrenewable resources. Examination of policy issues associated with forests, fisheries, groundwater, energy resources, watersheds, soil, global climate, and wildlife.—III. (III.) Wilen

290. Topics in Agricultural and Resource Economics (3)
Lecture—3 hours. Selected topics in agricultural and resource economics, focusing on current research. May be repeated 4 times for credit. Not offered every year.—I, II, III. (I, II, III.)

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

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

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

299D. Special Study for Doctoral Dissertation (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Agricultural Systems and Environment

Minor Program Requirements:

UNITS

Agricultural Systems and Environment 18-19

Preparatory material: Course in statistics such as Statistics 13, 32, 100, Plant Sciences 120, Sociology 42B or equivalent. Course in plant science such as Plant Sciences 2, Biological Sciences 1C, or equivalent; completion of Biological Sciences 2A and 2B and 2C also fulfills this requirement.

Select one of the two following tracks:

Sustainable Agriculture track

Plant Sciences 142 or 150 4
Soil Science 100 5
Plant Sciences 105 or 176 or Entomology 110 3-5
Minimum of six units from the following: Plant Sciences 110A, 110C, 110L, 112, 113, 114 170A, 170B 6

Range and Natural Resources track

Plant Sciences 130 3
Minimum of 15 units from the following: Plant Sciences 112, 131, 135, 150, Environmental Science and Policy 123, 172, Wildlife, Fish and Conservation Biology 110, 151

Minor Advisers. K.J. Rice *(Plant Sciences)*

Advising Center is located in 1220A Plant and Environmental Sciences (530) 752-1715.

Agronomy

See Plant Sciences, on page 461.

Agronomy and Range Science

See Plant Sciences, on page 461.

American Studies

(College of Letters and Science)

Eric Smoodin, Ph.D., Program Director

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Eric Smoodin, Ph.D. *(American Studies)*
Julie Sze, Ph.D. *(American Studies)*
Patricia Turner, Ph.D. *(African American and African Studies, American Studies)*
Grace Wang, Ph.D. *(American Studies)*

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Carolyn de la Peña, Ph.D., Associate Professor
Ari Y. Kelman, Ph.D., Assistant Professor
Michael L. Smith, Ph.D., Senior Lecturer
Academic Senate Distinguished Teaching Award
Eric Smoodin, Ph.D., Professor
Julie Sze, Ph.D., Associate Professor
Patricia Turner, Ph.D., Professor
Grace Wang, Ph.D., Assistant Professor

Emeriti Faculty

Jay Mechling, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
David Scofield Wilson, Ph.D., Senior Lecturer Emeritus

The Major Program

American Studies offers an alternative approach to the study of American experience for students who feel too limited by departmental approaches. Lower division, introductory classes explore the ways in which cultural systems shape and reflect life in the United States. These classes pay close attention to the ways in which differences of class, race, gender, generation, ethnicity, religion, and sexual orientation unevenly affect American lives.

The Program. American Studies majors take five upper division, in-depth classes and seminars devoted to close study of major thinkers and of issues crucial to the practice of American Studies. Advanced work in at least two other departments or programs allows each student to emphasize a period, a problem, or a subject tailored to his or her own individual education goals. Students have the option of writing a senior thesis within this emphasis.

Career Alternatives. As an interdisciplinary program, American Studies provides a good liberal arts and sciences undergraduate education. American Studies maximizes a student's contact with a variety of subject matter and approaches. Graduates have moved into a broad range of career settings, including journalism, law, medicine, nursing, law enforcement, teaching, environmental planning, library science, museum curatorship, and business. Some students discover new career possibilities through their internships in American institutions.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 24

Preparatory Subject Matter 24
American Studies 10 4
One additional lower division American Studies course 4
One course from African American and African Studies 10, Asian American Studies 1, Chicana/o Studies 10, Native American Studies 1, or an equivalent course in racial and ethnic diversity 4
One course from Anthropology 2, Sociology 2, Women's Studies 50, or an equivalent course in social science approaches to culture 4
One course from History 17A, 17B, 72A, 72B 4
One course from English 30A, 30B, Film Studies 1, or an equivalent course introducing critical approaches to literary and visual texts in the humanities 4

Depth Subject Matter 40

American Studies 100 and 160 8
American Studies Electives: Three additional upper-division American Studies courses 12
Emphasis 20
In consultation with the American Studies Undergraduate Adviser, the student designs a program of 20 units (typically five courses) of upper division course work around a unifying theme, period, or subject matter in American cultures. The courses should come from two or more departments or programs and can include up to 8 units of American Studies courses. Only 4 units of course 192 (internship) can be included in the emphasis. The student may choose the senior thesis option (190A-190B) for 8 units of the emphasis and take the remaining 12 units outside the program.

Total Units for the Major 64

Recommended

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

Minor Program Requirements:

UNITS

American Studies 20

American Studies, upper division courses 20
No more than 8 units of course 192 may be counted toward this total.

Faculty Advisers. C. Biltekoff, C. de la Peña, A.Y. Kelman, J. Mechling, M. Smith, E. Smoodin, J. Sze, G. Wang

Courses in American Studies (AMS)

Lower Division Courses

1A. Science and American Culture (4)
Lecture—3 hours; discussion—1 hour. American science as a cultural system. Mutual influence and interaction of that system with other cultural systems including religion, social thought, art, architecture, literature, music, and common sense. GE credit: ArtHum, Div, Wrt.—I.

1B. Religion in American Lives (4)
Lecture—3 hours; discussion—1 hour. Religions and spiritual practices in the United States, and their interrelationships with other aspects of U.S. history, society and culture; indigenous and imported faiths, and the impact of immigration, colonization and culture contact on religious systems. GE credit: ArtHum or SocSci, Div, Wrt.—I. (I.) Kelman

1C. American Lives Through Autobiography (4)
Lecture—3 hours; discussion—1 hour. American culture as understood through the individual life stories told by Americans, with attention to the roles of gender, race, ethnicity, social class, and sexual orientation in the individual's life course. GE credit: ArtHum or SocSci, Div, Wrt.—II.

1E. Nature and Culture in America (4)
Lecture—3 hours; fieldwork—3 hours. Uses and abuses of nature in America; patterns of inhabitation, exploitation, appreciation, and neglect; attention to California; emphasis on metaphor as a key to understanding ourselves and the natural world; attention to models of healing: stewardship, ecology, the "rights" movement. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—III. Smith, Sze

4. Freshman Seminar (2)
Seminar—2 hours. Prerequisite: open only to students who have completed fewer than 40 quarter units. Investigation of a special topic in American Studies through shared readings, discussions, written assignments, and special activities (such as fieldwork, site visits). Emphasis on student participation in learning. Limited enrollment.—II, III. (II, III.)

5. Technology in American Lives (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. Technology as both a material cultural force and a symbol in American culture; the lives of engineers at work and play; images of the engineer and technology in popular culture; social political and ethical issues raised by technology. GE credit: ArtHum or SocSci, Wrt.—I. (I.) Smith

10. Introduction to American Studies (4)
Lecture—3 hours; discussion—1 hour. United States history, culture and society. Examination of cultural objects and social practices. Topics include popular culture (film, TV, Internet), cultural diversity, social activism, play, and communication. GE credit: ArtHum or SocSci, Div, Wrt.—III. Biltekoff, Wang

21. Objects and Everyday Life (4)
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: completion of subject A requirement. Material culture (objects and artifacts such as toys, furnishings, the built environment) as text for under-

standing everyday lives (gender, social class, ethnicity, region, age); collecting and displaying material culture; commodity capitalism) of individuals and communities in the United States. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—III. de la Peña

25. United States as a Business Culture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: completed Subject A requirement. Business as a cultural system and its relation to religion, politics, arts, science, technology, and material culture; business themes of success, creativity, invention, and competition in American autobiographies, fiction, advice literature, film, and television; cultures of the workplace; multinational business. GE credit: ArtHum or SocSci, Div, Wrt.—I. (I.) de la Pena

30. Images of America and Americans in Popular Culture (4)
Lecture—3 hours; discussion—1 hour. Investigation of verbal and visual discourses about American identity in various popular culture products, including film, television, radio, music, fiction, art, advertising, and commercial experiences; discourses about the United States in the popular culture of other societies. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—(I.) Kelman, Smoodin

55. Food in American Culture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: complete Subject A requirement. Food as a cultural system in the United States; food in the performance of individual and group identity, including gender and ethnicity; food in literature, art, popular culture (film, television, advertising), and folk culture; the food industry and business. GE Credit: ArtHum or SocSci, Div, Wrt.—II. (II.) Biltekoff

59. Music and American Culture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: completed Subject A requirement. An examination of music and American culture. Studies will explore music in its cultural contexts, which may include examinations of recording and broadcasting, of race, class, and gender, the role of technology, and relationships between musical production, consumption and listening. GE Credit: ArtHum or SocSci, Div, Wrt.—I. (I.) Kelman, Wang

95. Careers and Identity in American Culture (2)
Lecture—1 hour; discussion—1 hour. Defining one's identity through the career. The life course, preparation, and choices. Personality and career. Ethics. Gender, ethnicity, sexuality, and social class in the workplace. The transnational workplace. Conflicts between the career and other social roles.—I, II, III, IV. (I, II, III, IV.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Individual Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

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

101A-H. Special Topics (4)
Seminar—3 hours, intensive reading, writing, and special projects. Interdisciplinary group study of special topics in American Culture Studies, designed for non-majors as well as majors. Content will vary according to the instructor and in accord with the following titles: (A) Popular Culture Studies; (B) Women's Studies; (C) Material Aspects of American Culture; (D) American National Character; (E) American Lives Through Autobiography; (F) The Interrelationship Between Arts and Ideas; (G) New Directions in American Culture Studies; (H) Problems in Cross-Cultural American Studies. May be repeated for credit in different subject area only.—I, II, III. (I, II, III.)

110. A Decade in American Civilization (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: one of courses 1A, 1B, 1C, 1D, 1E or 1F. Close examination of a single decade in American civilization; the connections between the history, literature, arts, customs, and ideas of Americans living in the decade. Issues and representations of race, class, gender, age, and sexuality in the decade. May be repeated for credit if decades studied are different. GE credit: ArtHum or SocSci, Div, Wrt.—I. (I.)

120. American Folklore and Folklife (4)
Lecture—3 hours; fieldwork—1 hour. Theory and method of the study of American folk traditions, including oral lore, customs, music, and material folk culture; the uses and meanings of those traditions in various folk communities, including families, ethnic institutions, voluntary organizations, and occupational groups GE credit: ArtHum or SocSci, Div, Wrt.—III. (III.)

125. Corporate Cultures (4)
Lecture—2 hours; discussion—1 hour; fieldwork—1 hour. Prerequisite: one course chosen from course 120, Anthropology 2, Psychology 16, or Sociology 1; or consent of instructor. Exploration of the small group cultures of American corporate workplaces, including the role of environment, stories, jokes, rituals, ceremonies, personal style, and play. The effects of cultural diversity upon corporate cultures, both from within and in contact with foreign corporations.—III. (III.) de la Peña

130. American Popular Culture (4)
Lecture/discussion—3 hours; fieldwork—1 hour. Prerequisite: course 1 or upper division standing. American popular expression and experience as a cultural system, and the relationship between this system and elite and folk cultures. Exploration of theories and methods for discovering and interpreting patterns of meaning in American popular culture. GE credit: ArtHum or SocSci, Div, Wrt.—II. (II.) Kelman, Smoodin

139. Feminist Cultural Studies (4)
Lecture/discussion—4 hours. Prerequisite: one course in Women's Studies or American Studies. The histories, theories, and practices of feminist traditions within cultural studies. (Same course as Women's Studies 139.) GE credit: SocSci, Div, Wrt.—III. (III.)

151. American Landscapes and Places (4)
Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 1, upper division standing. Comparative study of several American cultural populations inhabiting a region, including their relationship to a shared biological, physical, and social environment, their intercultural relations, and their relationships to the dominant American popular and elite culture and folk traditions. GE credit: ArtHum or SocSci, Div, Wrt.—II. (II.) Smith

152. The Lives of Children in America (4)
Lecture—2 hours; discussion—2 hours. Experience of childhood and adolescence in American culture, as understood through historical, literary, artistic, and social scientific approaches. GE credit: ArtHum or SocSci, Div, Wrt.—III. (III.) Smith

153. The Individual and Community in America (4)
Lecture—2 hours; discussion—2 hours. Interdisciplinary examination of past and present tensions between the individual and the community in American experience, as those tensions are expressed in such cultural systems as folklore, public ritual, popular entertainment, literature, fine arts, architecture, and social thought. GE credit: ArtHum or SocSci, Div, Wrt.—II. (II.) Kelman, Wang

154. The Lives of Men in America (4)
Lecture—2 hours; discussion—2 hours. Interdisciplinary examination of the lives of boys and men in America, toward understanding cultural definitions of masculinity, the ways individuals have accepted or resisted these definitions, and the broader consequences of the struggle over the social construction of gender. GE credit: ArtHum or SocSci, Div, Wrt.—I. (I.) Mechling

155. Symbols and Rituals in American Life (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. Interdisciplinary examination of selected, richly expressive events (parades, festivals, holidays) and symbols (flags, memorials, temples) which encode nationwide values and understandings (Thanksgiving, New Year's, etc.) or which realize more limited, special meanings (Mardi Gras, rodeo, Kwanza, graduation, bar mitzvah, etc.). Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—III. Biltekoff, de la Peña

156. Race, Culture and Society in the United States (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. Interdisciplinary examination of the significance of race in the making of America; how race shapes culture, identities and social processes in the United States; the interweaving of race with gender, class and nationhood in self and community. GE credit: ArtHum or SocSci, Div, Wrt.—II. (II.) Wang

157. Animals in American Culture (4)
Lecture—3 hours, discussion—1 hour. Animals as symbols in American thought, as found in folklore, popular culture, literature, and art; customs and stories around human-animal interactions, including hunting, religion, foodways, pets, zoos, circuses, rodeos, theme parks, and scientific research on animals. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—III. Sze

158. Technology and the Modern American Body (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Technocultural Studies 1 and either course 1A or 5. The history and analysis of the relationships between human bodies and technologies in modern society. Dominant and eccentric examples of how human bodies and technologies influence one another and reveal underlying cultural assumptions. (Same course as Technocultural Studies 158.) GE credit: ArtHum.—I, III. de la Pena

160. Undergraduate Seminar in American Studies (4)
Seminar—3 hours; term paper. Prerequisite: open to junior and senior American Studies majors only. Intensive reading, discussion, research, and writing by small groups in selected topics of American Studies scholarship; emphasis on theory and its application to American material. Limited enrollment. May be repeated one time for credit when content differs.—II, III. (II, III.)

190A. Senior Thesis Research Seminar (4)
Seminar—2 hours; extensive writing. Prerequisite: senior standing in American Studies major. Research and prospectus writing for senior thesis.—I. (I.) Sze, Wang

190B. Senior Thesis (4)
Independent study—12 hours. Prerequisite: senior standing in American Studies major and course 190A. In consultation with advisor, student writes an extended research paper on a topic proposed in course 190A.—I, II, III. (I, II, III.)

192. Internship in American Institutions (1-12)
Internship—1-12 hours. Prerequisite: enrollment dependent on availability of intern positions, with priority to American Studies majors. Supervised internship and study within and about key organizations in American civilization at archives, museums, schools, historical societies, governmental and social agencies, etc., with attention to the techniques of participant observation and the collection of ethnographical data. May be repeated for credit for a total of 12 units. (P/NP grading only.)

197T. Tutoring in American Studies (1-5)
Tutorial—1-5 hours. Prerequisite: consent of Chairperson of American Studies Program. Tutoring in lower division American Studies courses, usually in small discussion groups. Periodic meetings with the

instructor in charge; reports and readings. May be repeated for credit when the tutoring is for a different course. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor and chairperson of American Studies Program. (P/NP grading only.)

Graduate Courses

220. American Folklore and Folklife (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Theory and methods for the study of the folklore and the folk customary behavior of Americans; contributions of folklore studies to scholarship in humanities and social science disciplines.—III. (III.) Turner

250. Cultural Study of Masculinities (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Interdisciplinary approaches to understanding the social and cultural construction of masculinities; attention to the effects of biology, gender, race, class, sexual and national identities; criticism of oral, printed, visual, and mass mediated texts, and of social relations and structures. (Same course as Women's Studies 250.)—II.

255. Food in American Culture (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or advanced undergraduate with consent of instructor. Interdisciplinary theories and methods for the study of food in American culture; food studies in relation to issues of identity (age, gender, ethnicity, religion, region, etc.), social relations, systems of production, and cultures of consumption. Not offered every year. Biltekoff, de la Pena

298. Group Study in Animal Biology (1-5)
Prerequisite: graduate standing.

299. Individual Study (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Anatomy

See Anatomy, Physiology and Cell Biology, on page 147; and Courses in Cell Biology and Human Anatomy (CHA), on page 390.

Anatomy, Physiology and Cell Biology

See Veterinary Medicine, School of, on page 517.

Anesthesiology and Pain Medicine

See Medicine, School of, on page 380.

Animal Behavior (A Graduate Group)

Joy Mench, Ph.D., Chairperson of the Group

Group Office. 310 Life Sciences
(530) 752-2981; Fax (530) 752-8822;
animalbehavior@biosci.ucdavis.edu;
http://biosci2.ucdavis.edu/ggc/anb/

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

Graduate Study. The Ph.D. program in Animal Behavior is an interdepartmental program focusing on the adaptive and evolutionary bases of animal behavior. The program trains students for teaching and research in a variety of areas, including anthropology, animal science, ecology, entomology, neurobiology, psychology, physiology, veterinary science, wildlife biology, and zoology. Areas of emphasis include ethology and evolutionary bases of animal behavior; physiological basis of animal behavior; behavior and conservation of wild animals; and behavior and management of domestic and captive animals. Resources available to students, in addition to various departmental facilities, include those of the California Regional Primate Research Center, Bodega Marine Laboratory, and the Agricultural Field Stations.

There is an application deadline of Dec 15 for fall quarter.

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

Ecology: e.g., Evolution and Ecology 101, Environmental Science and Policy 100
Genetics: e.g., Biological Sciences 101
Statistics: e.g., Statistics 102 or Psychology 103
Evolution: e.g., Evolution and Ecology 100
Animal behavior: Neurobiology, Physiology, and Behavior 102
Physiology: e.g. Neurobiology, Physiology, and Behavior 100

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

Fundamentals of Animal Behavior: Animal Behavior 290A and 290B
Comparative psychology: Psychology 250
Methodology and grant writing: Animal Behavior 201
Advanced statistics: Psychology 204A, 204B, 204C, or 204D, Statistics 106, 108, 138, 205, Agronomy 204, 206
Graduate seminars: Animal Behavior 290
Strongly recommended: a course on teaching science: Biological Sciences 310, Psychology 390A, 390B
Electives: Students also take two additional courses (of at least 3 units each) in the student's area of specialization, chosen in consultation with and approved by the Course Guidance Committee.

Strongly recommended: at least one additional course in statistics or modeling. In addition to the above listed courses, modeling courses include Population Biology 231 and Psychology 128.

Courses in Animal Behavior (ANB)

Graduate Courses

201. Scientific Approaches to Animal Behavior Research (3)
Lecture—3 hours. Prerequisite: consent of instructor. Philosophical issues, goals, strategies and tools in field and laboratory research. May be repeated for credit when topics differ.—III. (III.)

210. History of Animal Behavior (1)
Discussion—1 hour. Prerequisite: consent of instructor. Classic, seminal papers in animal behavior. Discussion of readings and broader historical context in which papers were written. (S/U grading only.)—I. Capitanio

218A. Fundamentals of Animal Behavior (5)
Lecture/discussion—4 hours; discussion—1 hour. Prerequisite: consent of instructor; upper-division undergraduate introduction to the biology of behavior, such as Psychology 101, 122, 123, Neurobiology, Physiology, and Behavior 102, 150, 152, Wildlife, Fish, and Conservation Biology 141, Entomology 104, or Animal Science 105. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Same course as Psychology 218A.)—I. (I.) Owings, Sih

218B. Fundamentals of Animal Behavior (5)
Lecture/discussion—4 hours; discussion—1 hour. Prerequisite: consent of instructor; course 218A or Psychology 218A. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Same course as Psychology 218B.)—II. (II.) Owings, Sih

221. Animal Behavior, Ecology and Evolution (3)
Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 102, Evolution and Ecology 100, 101 or the equivalent, graduate standing, and consent of instructor. The interface between animal behavior, ecology and evolution. New developments in behavioral ecology and development and testing of hypotheses in this discipline. (Same course as Population Biology 221.)—Stamps

230A. Interdisciplinary Approaches to Animal Behavior (3)
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Analysis of literature in behavior and an allied discipline or disciplines that offer the potential, in combination, to advance the understanding of a topic in animal behavior conceptually and empirically. Topics will vary from year to year.—II. (II.)

230B. Interdisciplinary Approaches to Animal Behavior (5)
Workshop—4 days total; discussion—3 hours; term paper. Prerequisite: course 230A the previous quarter. Development of an empirical or theoretical interdisciplinary approach to research on a current topic in animal behavior.

270. Research Conference in Behavioral Ecology (1)
Conference—1 hour. Prerequisite: graduate standing and consent of instructor. Critical presentation and evaluation of current literature and ongoing research in behavioral ecology. Limited enrollment. May be repeated for credit. (S/U grading only.)—II, III. (II, III.)

287. Advanced Animal Behavior (2)
Seminar—2 hours. Prerequisite: graduate standing and consent of instructor, courses in animal behavior (Neurobiology, Physiology, and Behavior 102 or the equivalent), and either evolution (Evolution and Ecology 100 or the equivalent) or ecology (Evolution and Ecology 101 or the equivalent). Reading, reports and discussion on current topics in animal behavior, with a focus on topics that lie at the interface between animal behavior, ecology and evolution. (Same course as Population Biology 287.) May be repeated two times for credit.—III. Stamps

290. Seminar in Animal Behavior (1-3)
Seminar—1-3 hours. Prerequisite: consent of instructor. Selected topics in animal behavior. (S/U grading only.)—I, II, III. (I, II, III.)

294. Seminar in Behavioral Ecology of Predators and Prey (3)
Seminar—2 hours. Prerequisite: graduate standing. Presentation and analysis of research papers on social and foraging behavior of predatory animals, antipredator strategies of prey species, co-evolution of predators and prey, and ecology of predator prey interactions. May be repeated two times for credit. (Same course as Wildlife, Fish, and Conservation Biology 294.) Offered in alternate years.—II. Caro

298. Group Study (1-5)
Prerequisite: graduate standing and consent of instructor.

299. Research (1-12)
Prerequisite: and consent of instructor. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Animal Biology

(College of Agricultural and Environmental Sciences)

Faculty. Faculty includes members of the Departments of Animal Science, on page 150; Entomology, on page 284; Nematology, on page 430; and Wildlife, Fish, and Conservation Biology, on page 533.

The Major Program

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

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

Internships and Career Alternatives. The program and interests of each student in solving societal problems guides him or her to logical internship and career choices. On- and off-campus internship opportunities are available in research laboratories, in field situations, with governmental agencies, with private industry, and in international programs. A degree in Animal Biology prepares students for careers in research, teaching, governmental regulation, health or agriculture as each relates to the integrative biology or ecology of animals. Careers in veterinary medicine, animal husbandry and animal management are open to Animal Biology majors, however, other preparation may be required. Students in the major gain research experience and may choose to continue their training at the graduate or professional level in a variety of biological disciplines.

B.S. Major Requirements:

	UNITS
Preparatory Subject Matter	**68-74**
Biological Sciences 2A, 2B, and 2C	14
Chemistry 2A-2B-2C, and 8A-8B or 118A-118B	21-23
Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C	9-12
Physics 7A-7B-7C	12
One course from Statistics 13 or 100 or 102 or Agricultural Management and Rangeland Resources 120	4
Animal Biology 50A, 50B, 50C	8
Depth Subject Matter	**29-38**
Biological Sciences 101	4
Animal Biology 102 and 103 or Biological Sciences 102 and 103	6-10
One course from Neurobiology, Physiology, and Behavior 101, 117; Entomology 102; Wildlife, Fish, and Conservation Biology 121	3-5
One course from Anatomy, Physiology and Cell Biology 100; Entomology 101; Neurobiology, Physiology, and Behavior 123	3-4
Evolution and Ecology 100	4
One course from Environmental Science and Policy 100, 121; Evolution and Ecology 101, 102	4
Animal Biology 187	2
Animal Biology 189 and 189D	3-5
Restricted Electives	**25**
Focused specialty upper division courses as outlined in the student's major proposal (from course 187) with approval of an adviser.	
Total Units for the Degree	**122-137**

Master Adviser. E. Lewis

Advising Center for the major, including peer advising, is located in 152 Hutchison Hall (530) 754-7277.

Courses in Animal Biology (ABI)

Lower Division Courses

50A. Animal Biology Laboratory (2)
Lecture/laboratory—4 hours. Scientific methods for answering questions in animal biology by doing exercises to demonstrate hypothesis testing and reporting, short laboratory, population and field experiments. Maintain notebooks, analyze data, interpret results and write reports.—I. (I.) Kimsey

50B. Animal Biology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, Biological Sciences 1B (may be taken concurrently). Basic biological disciplines important to an understanding of practical animal biology issues including the evolution of animal groups, genetic mechanisms, animal physiology as it relates to maintenance and production, and aspects of comparative anatomy, behavior and ecology.—II. (II.) Caswell-Chen

50C. Animal Biology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1B, 1C, courses 50A, 50B. Animal management and conservation. Societal concerns arising from management and conservation issues, including economics, aesthetics, regulations, safety, public perspectives and advocacy.—III. (III.) Caswell-Chen, Ferris, Lanzaro

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

98. Directed Group Study (1-5)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

102. Animal Biochemistry and Metabolism (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: Chemistry 2A-2B, 8A-8B. Water and biological buffers; thermodynamics of metabolism; structure and function of biomolecules; enzyme kinetics and function; membrane biology; digestion and absorption; carbohydrate metabolism. Not open for credit to students who have completed Biological Sciences 102.—I. (I.) Calvert

103. Animal Biochemistry and Metabolism (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 102. Physiological function and metabolism of lipids and amino acids; integrative metabolism; biochemical basis for nutrient requirements; structure and function of vitamins; mineral metabolism and requirements. Not open for credit to students who have completed Biological Sciences 103.—II. (II.) Calvert

187. Animal Biology Seminar (2)
Seminar—1 hour; discussion—1 hour. Prerequisite: junior standing, courses 50A, 50B, 50C. Seminar leading to development of the Major Proposal for the Animal Biology major.—I. (I.) Edwin Lewis

189. Senior Practicum (2)
Independent study—6 hours. Prerequisite: junior standing, courses 50A, 50B, 50C, and 187; course 189D concurrently the first time course 189 is taken. The practicum may be an experimental research project, a library research project or some other creative activity that will serve as a capstone experience for the Animal Biology major. May be repeated one time for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

189D. Senior Practicum Discussion (1)
Discussion—1 hour. Prerequisite: junior standing, courses 50A, 50B, 50C, and 187; course 189 required concurrently. Course helps prevent or solve problems during the students' senior practicum activity. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship in Animal Biology (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Office, laboratory or fieldwork off or on campus in research, governmental regulation, policy making, and private enterprise dealing with animal related issues of production, welfare, pest management, biodiversity and the environment. All requirements of Internship Approval Request form must be met. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Animal Biology (A Graduate Group)

Andrew Sih, Ph.D., Chairperson of the Group

Group Office. 1202 B Meyer Hall
(530) 752-2382; Fax (530) 754-4359
http://biosci3.ucdavis.edu/GradGroups/ANB/Default.aspx

Faculty

Thomas E. Adams, Ph.D., Professor *(Animal Science)*
Barry A. Ball, Ph.D., Professor *(Population Health and Reproduction; School of Veterinary Medicine)*
Danika L. Bannasch, Ph.D., Associate Professor *(Population Health and Reproduction; School of Veterinary Medicine)*
Trish Berger, Ph.D., Professor *(Animal Science)*
Steven L. Berry, D.V.M.-Specialist in Cooperative Extension and Lecturer (Animal Science)

Chris C. Calvert, Ph.D., Professor *(Animal Science)*
Ernie Chang, Ph.D., Professor
(Animal Science; located at Bodega Marine Lab)
Alan J. Conley, Ph.D., Professor
(Population Health and Reproduction; School of Veterinary Medicine)
Mary E. Delany, Ph.D., Professor *(Animal Science)*
Edward J. DePeters, Ph.D., Professor
(Animal Science)
Serge I. Doroshov, Ph.D., Professor *(Animal Science)*
Holly B. Ernest, D.V.M., Ph.D., Assistant Professor
(Population, Health and Reproduction; School of Veterinary Medicine)
James G. Fadel, Ph.D., Professor *(Animal Science)*
Thomas R. Famula, Ph.D., Professor
(Animal Science)
Russell C. Hovey, Ph.D., Associate Professor
(Animal Science)
Silas S.O. Hung, Ph.D., Professor *(Animal Science)*
Michael L. Johnson, Ph.D., Associate Research Scientist *(Director, Aquatic Ecosystems Analysis Laboratory)*; Adjunct Research Professor *(Department of Medicine and Epidemiology; School of Veterinary Medicine)*
Ermias Kebreab, Ph.D., Professor *(Animal Science)*
Kirk C. Klasing, Ph.D., Professor *(Animal Science)*
Dietmar Kueltz, Ph.D., Professor
(Animal Science)
Leslie A. Lyons, Ph.D., Associate Professor
(Population Health and Reproduction; School of Veterinary Medicine)
Elizabeth Maga, Ph.D., Associate Researcher and Lecturer *(Animal Science)*
Brenda J. McCowan, Ph.D., Associate Professional Researcher and Research Behaviorist *(Veterinary Medicine Teaching and Research Center and California National Primate Research Center)*
Juan F. Medrano, Ph.D., Professor *(Animal Science)*
Joy A. Mench, Ph.D., Professor *(Animal Science)*
Deanne Meyer, Ph.D., Specialist in Cooperative Extension and Lecturer *(Animal Science)*
Stuart Meyers, Ph.D., Associate Professor
(Anatomy, Physiology and Cell Biology; School of Veterinary Medicine)
James R. Millam, Ph.D., Professor *(Animal Science)*
Frank M. Mitloehner, Ph.D., Associate Professor and Associate Specialist in Cooperative Extension *(Animal Science)*
James D. Murray, Ph.D., Professor *(Animal Science)*
Anita M. Oberbauer, Ph.D., Professor
(Animal Science)
James W. Oltjen, Ph.D., Specialist in Cooperative Extension and Lecturer *(Animal Science)*
Peter H. Robinson, Ph.D., Specialist in Cooperative Extension and Lecturer *(Animal Science)*
Jan F. Roser, Ph.D., Professor *(Animal Science)*
Pablo J. Ross, Ph.D., Assistant Professor
(Animal Science)
Roberto D. Sainz, Ph.D., Professor
(Animal Science)
M. Cecilia Torres-Penedo, Ph.D., Associate Research Geneticist *(Veterinary Genetics Laboratory)*
Cassandra B. Tucker, Ph.D., Assistant Professor
(Animal Science)
Alison L. Van Eenennaam, Ph.D., Specialist in Cooperative Extension and Lecturer *(Animal Science)*
Catherine A. VandeVoort, Ph.D., Professor-in-Residence *(California National Primate Research Center; and Reproductive Biology, Obstetrics and Gynecology; School of Medicine)*
Barry W. Wilson, Ph.D., Professor *(Animal Science)*
Richard A. Zinn, Ph.D., Professor *(Animal Science; located at Desert Research and Extension Center)*

Graduate Study. The Graduate Group in Animal Biology offers programs of study and research leading to the M.S. and the Ph.D. degrees. The Animal Biology Graduate Group focuses on integrated animal biology. Each student individually tailors his/her program of study to meet individual needs. The Animal Biology Graduate Group is unique in encouraging a multidisciplinary or interdisciplinary approach involving physiology, nutrition, genetics, ecology and/or behavior within the context of organismal animal biology.

Graduate Advisers. S.S.O. Hung, E.A. Maga

Courses in Animal Biology (ABG)

Graduate Courses

200A. Integrated Animal Biology I (3)
Lecture/discussion—3 hours. Prerequisite: graduate standing; Biological Sciences 101 or the equivalent or the consent of the instructor. Natural history, management, historical and current uses, and specialized disciplinary features of model and novel animal systems used in research. Development of conceptual approaches in organismal biology to improve experimental design and interpretation of interdisciplinary research studies. Limited enrollment; first pass restricted to Animal Biology Graduate Group students.—I. (I.) Berger, DePeters

200B. Integrated Animal Biology II (3)
Lecture/discussion—3 hours. Prerequisite: course 200A. Natural history, management, historical and current uses, and specialized disciplinary features of model and novel animal systems used in research. Development of conceptual approaches in organismal biology to improve experimental design and interpretation of interdisciplinary research studies. Limited enrollment; first pass restricted to Animal Biology Graduate Group students.—II. (II.) Delany

202. Grant Procurement and Administration (2)
Lecture—1 hour; discussion/laboratory—1 hour. Prerequisite: course 200B. Pass1 restricted to Animal Biology Graduate Group students. Topics include: structure of grants, attention to specifications, concise persuasive writing, and grant budgeting. Identify grant opportunities, write a persuasive research grant proposal, and administer grants. Limited enrollment.—I. (I.) Mitloehner

255. Physiology of the Stress Response (2)
Lecture/discussion—2 hours. Prerequisite: graduate student. Definition of Stress; Physiological mechanisms of adaptation to stress; Hormonal control of the systemic stress response; Mechanisms of the cellular stress response; Discussion of current trends in stress physiology and current methods for studying the stress response. (Same course as Molecular, Cellular, and Integrative Physiology 255.)—III. (III.) Kueltz

290. Seminar in Animal Biology (1)
Seminar—1 hour. Prerequisite: graduate standing. Seminar on advanced topics in animal biology. Presentations by members of the Animal Biology Graduate Group and guest speakers. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Student presentations of research in Animal Biology and discussions among participating students and Animal Biology faculty. May be repeated for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.)

298. Group Study in Animal Biology (1-5)
Prerequisite: graduate standing.

299. Research (1-11)
Prerequisite: graduate standing and consent of instructor. Research with a faculty member in Animal Biology Graduate Group. May be repeated for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.)

Professional Courses

300. Methods in Teaching Animal Biology (2)
Lecture/discussion—2 hours. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching animal biology. Includes analysis of laboratory exercises, discussion of teaching techniques, grading scientific essays, preparing for and conducting discussion or laboratory sections, formulating quiz and exam questions under instructor supervision. May be repeated up to three times for credit. (S/U grading only.)—I, II. (I, II.) Famula, Oberbauer

396. Teaching Assistant Training Practicum (1-4)
Variable—3-12 hours. Prerequisite: graduate standing and consent of instructor. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Professional Course

401. Ethics and Professionalism in Animal Biology (2)
Discussion—2 hours. Prerequisite: graduate standing; first pass Animal Biology graduate group students. Case studies and discussion of ethical and professional issues for animal biologists, including the use of animals in research and teaching, patenting and intellectual property, consulting and conflict of interest, scientific integrity, dealing with the media, and mentoring relationships.—III. (III.) Mench

Animal Genetics

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Animal Science, on page 150.

Major Program. See the major in Animal Science, on page 150.

Related Courses. See Biological Sciences 101, 101D; Evolution and Ecology 102, 175; Genetics Graduate Group courses; Microbiology 150, 170, 215, 260, 274, 292; Molecular and Cellular Biology 121, 141, 160L, 161, 162, 163, 164, 178, 182, 221C, 257, 262, 263; Neurobiology, Physiology, and Behavior 131; Plant Biology 151, 152, 154, 161A, 161B; Plant Pathology 215X, 217; Plant Sciences 220, 221.

Courses in Animal Genetics (ANG)

Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center in 1202 Meyer Hall (530) 754-7915.

Upper Division Courses

101. Animal Cytogenetics (3)
Laboratory/discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 101, 102 or the equivalent. Principles and techniques of cytogenetics applied to animal systems; chromosome harvest techniques, analysis of mitosis and meiosis, karyotyping, chromosome banding, cytogenetic mapping, chromosome structure and function, comparative cytogenetics.

105. Horse Genetics (2)
Lecture—2 hours. Prerequisite: course 15 and Biological Sciences 101. Coat color, parentage testing, medical genetics, pedigrees, breeds, the gene map and genus Equus. Emphasis on understanding horse genetics based on the unity of mammalian genetics and making breeding decisions based on fundamental genetic concepts.—III. (III.) Famula

107. Genetics and Animal Breeding (5)
Lecture—4 hours; laboratory—3 hours. Prerequisite: Biological Sciences 101. Principles of quantitative genetics applied to improvement of livestock and poultry. Effects of mating systems and selection methods are emphasized with illustration from current breeding practices.—I. (I.) Medrano

111. Molecular Biology Laboratory Techniques (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C, 101, 102, 103. Introduction to the concepts and techniques used in molecular biology; the role of this technology in both basic and applied animal research, and participation in laboratories using some of the most common techniques in molecular biology.—I. (I.) Kueltz, Murray, Williamson

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. Selected topics relating to animal genetics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

204. Theory of Quantitative Genetics (3)
Lecture—3 hours. Prerequisite: course 107 or the equivalent. Theoretical basis of quantitative genetics and the consequences of Mendelian inheritance. Concepts used to estimate quantitative genetic differences and basis for partitioning the phenotypic variance. Offered in alternate years.—III.

206. Advanced Domestic Animal Breeding (3)
Lecture—3 hours. Prerequisite: course 107 and Animal Science 205; course 204 recommended. Procedures for the genetic evaluation of individuals to include selection indices and mixed model evaluation for single and multiple traits. Methods of estimating genetic trends. Offered in alternate years.—III. Famula

208. Estimation of Genetic Parameters (3)
Lecture—3 hours. Prerequisite: course 107 and Animal Science 205; courses 204 and 108 recommended. General methods for the estimation of components of variance and covariance and their application to the estimation of heritability, repeatability and genetic correlations are considered. Specific emphasis is given to procedures applicable to livestock populations under selection.

211. Genetic Engineering of Animals (2)
Lecture—1 hour; lecture/discussion—1 hour. Review of techniques for the genetic engineering of animals and their limitations and applications. Student-led discussions of recent papers in the field and possible future applications of genetically engineered animals in basic research and applied agricultural and medical research. Offered in alternate years. (S/U grading only.)—(III.) Murray

212. Sequence Analysis in Molecular Genetics (2)
Lecture/laboratory—2 hours. Prerequisite: Biological Sciences 101 or the equivalent; graduate standing or consent of instructor. Use of computer algorithms and online databases to analyze nucleic acid and protein sequences in molecular genetics research. Offered in alternate years.—II. Medrano

298. Group Study (1-5)
Prerequisite: consent of instructor. Lectures and discussions of advanced topics in animal genetics. (S/U grading only.)

299. Research in Animal Genetics (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Animal Physiology

See Animal Biology, on page 148; Animal Science, on page 150; Neurobiology, Physiology, and Behavior, on page 431; Philosophy, on page 446; and Molecular, Cellular, and Integrative Physiology (A Graduate Group), on page 420.

Animal Science

(College of Agricultural and Environmental Sciences)

Anita M. Oberbauer Ph.D., Chairperson of the Department

Department Office. 2223 Meyer Hall
(530) 752-1250;
http://animalscience.ucdavis.edu/

Undergraduate Advising. 1202 Meyer Hall
(530) 754-7915; *http://asac.ucdavis.edu*

Master Adviser. E.J. DePeters

Advising Center for the major, minors and course offerings (including peer advising) is located in the Animal Science Advising Center in 1202 Meyer Hall (530) 754-7915. Each student will be assigned a faculty adviser through this office upon entering the major.

Graduate Advising. 1202 Meyer Hall
(530) 752-2382;
http://animalscience.ucdavis.edu/

Bodega Marine Laboratory
P.O. Box 247, Bodega Bay, CA (707) 875-2211
http://www-bml.ucdavis.edu/

Faculty

Thomas E. Adams, Ph.D., Professor,
Academic Senate Distinguished Teaching Award
Trish J. Berger, Ph.D., Professor
C. Christopher Calvert, Ph.D., Professor,
Academic Senate Distinguished Teaching Award
Ernest S. Chang, Ph.D., Professor
(Biological Sciences, Bodega Marine Laboratory)
Mary E. Delany, Ph.D., Professor and Associate Dean in CA&ES
Edward J. DePeters, Ph.D., Professor,
Academic Senate Distinguished Teaching Award, UC Davis Prize for Undergraduate Teaching and Scholarly Achievement
Serge I. Doroshov, Ph.D., Professor
John M. Eadie, Ph.D., Professor
James G. Fadel, Ph.D., Professor
Thomas R. Famula, Ph.D., Professor,
Academic Senate Distinguished Teaching Award
Russell C. Hovey, Ph.D., Associate Professor
Silas S. O. Hung, Ph.D., Professor
Ermias Kebreab, Ph.D., Professor
Annie J. King, Ph.D., Professor
Kirk C. Klasing, Ph.D., Professor
Dietmar Kueltz, Ph.D., Professor
Juan F. Medrano, Ph.D., Professor
Joy A. Mench, Ph.D., Professor
James R. Millam, Ph.D., Professor
Frank M. Mitloehner, Ph.D., Associate Professor and Associate Specialist in Cooperative Extension
James D. Murray, Ph.D., Professor
Anita M. Oberbauer, Ph.D., Professor,
Academic Senate Distinguished Teaching Award
Kathryn Radke, Ph.D., Professor
Janet F. Roser, Ph.D., Professor
Pablo J. Ross, Ph.D., Assistant Professor
Roberto D. Sainz, Ph.D., Professor
Cassandra B. Tucker, Ph.D., Assistant Professor
Barry W. Wilson, Ph.D., Professor
Richard A. Zinn, Ph.D., Professor

Emeriti Faculty

Ursula K. Abbott, Ph.D., Professor Emeritus
Hans Abplanalp, Ph.D., Professor Emeritus
Gary B. Anderson, Ph.D., Distinguished Professor Emeritus, *Distinguished Teaching Award-Graduate/Professional, UC Davis Prize for Undergraduate Teaching and Scholarly Achievement*
C. Robert Ashmore, Ph.D., Professor Emeritus
Wallis H. Clark, Jr., Ph.D., Professor Emeritus
Douglas E. Conklin, Ph.D., Professor Emeritus
Graham A. E. Gall, Ph.D., Professor Emeritus
William N. Garrett, Ph.D., Professor Emeritus
Yu-Bang Lee, Ph.D., Professor Emeritus
Edward O. Price, Ph.D., Professor Emeritus
Robert W. Touchberry, Ph.D., Professor Emeritus
Wesley W. Weathers, Ph.D., Professor Emeritus

Affiliated Faculty

Steven L. Berry, D.V.M., Specialist in Cooperative Extension and Lecturer
Francine A. Bradley, Ph.D., Specialist in Cooperative Extension and Lecturer
Fred S. Conte, Ph.D., Specialist in Cooperative Extension and Lecturer
Elizabeth A. Maga, Ph.D., Associate Researcher and Lecturer
Bernard P. May, Ph.D., Adjunct Professor
Deanne Meyer, Ph.D., Specialist in Cooperative Extension and Lecturer
Kenji Murata, Ph.D., Assistant Researcher
James W. Oltjen, Ph.D., Specialist in Cooperative Extension and Lecturer
Peter H. Robinson, Ph.D., Specialist in Cooperative Extension and Lecturer
Alison L. Van Eenennaam, Ph.D., Specialist in Cooperative Extension and Lecturer
Dana B. Van Liew, M.Ed., Lecturer, *Academic Federation Excellence in Teaching Award*
Gideon Zeidler, Ph.D., Associate Specialist in Cooperative Extension

The Major Program

The Animal Science major is devoted to the sciences central to understanding biological function of domestic and captive animals, their care, management, and utilization by people for food, fiber, companionship and recreation. Advances in science and technology, and an ever-growing human population, have increased the complexity of issues surrounding the care and management of animals. Specializations within the major allow students to develop a scientific appreciation of animals and their relationship to their environment. Graduates in Animal Science are able to advance the science and technology of animal care and management in an objective and effective manner for the betterment of animals and society.

The Program. The curriculum provides depth in the biological and physiological sciences and allows students to specialize within the broad field of applied animal science. Study begins with introductory courses in animal science, biology, chemistry, mathematics, and statistics. Students undertake advanced courses in animal behavior, biochemistry, genetics, nutrition, and physiology and the integration of these sciences to animal function, growth, reproduction, and lactation. Students complete the curriculum by choosing a specialization in either an animal science discipline (behavior, biochemistry, genetics, nutrition, or physiology) or in the sciences particular to a class of animals (aquatic, avian, companion, captive, equine, laboratory, livestock, dairy, or poultry).

Career Alternatives. A wide range of career opportunities are available to graduates. The primary goal of the major is to prepare students for graduate study leading to the M.S. and Ph.D. degrees; for continued study in a professional school such as veterinary medicine, human medicine or dentistry; for careers in research, agricultural production, farm and ranch management, or positions in business, sales, financial services, health care, agricultural extension, consulting services, teaching, journalism, or laboratory technology.

B.S. Major Requirements:

	UNITS
Preparatory Subject Matter	**56-61**
Animal Science 1, 2, 41, 41L	12
Biological Sciences 1A, 1B, 1C or 2A, 2B, 2C	14
Chemistry 2A, 2B and 8A, 8B or 118A, 118B	16-18
Plant Sciences 21 or Engineering Computer Science 15	3-4
Mathematics 16A, 16B or 17A, 17B or 21A, 21B	6-8
Plant Sciences 120 or Statistics 100	4

Note: Some professional and graduate schools may require additional preparatory

subject matter. Please consult the advising center.

Depth Subject Matter 38-42

Biology: Biological Sciences 101; Animal Genetics 107; Animal Biology 102, 103; Neurobiology, Physiology, and Behavior 101 24
Integrative Animal Biology: Animal Science 123, 124, and Neurobiology, Physiology, and Behavior 121 and 121L 13
Laboratory; Select one from the following: Animal Genetics 111; Animal Science 106 or 136 and 137; Microbiology 102L; Molecular and Cellular Biology 120L or 160L; Neurobiology, Physiology, and Behavior 101L or 104L; Pathology, Microbiology, and Immunology 126L 2-6

Area of Specialization..... 20-23

Choose one area of specialization below; the program of study must be approved in advance by your faculty adviser.

Animal Science with a Disciplinary Focus..... 20

Select 20 upper division units, with approval from your faculty adviser, to form a coherent series of courses in one of the following disciplines: animal behavior, biochemistry, genetics, nutrition, or physiology.

Aquatic Animals 20

Animal Science 18 and 131; Nutrition 124; and Animal Science 118 or 119.
Select additional units from any Animal Genetics or Animal Science course, or other courses approved by your faculty adviser.
Students in this specialization must take Animal Science 136 and 137 to meet their Laboratory Depth Subject Matter requirement.
Students in this specialization may elect to substitute any of Biological Sciences 104, Evolution and Ecology 112, or Wildlife, Fish, and Conservation Biology 120 and 121 for the 12-unit requirement under Integrative Animal Biology, with approval of your faculty adviser.

Avian Sciences 20

Avian Sciences 13, 100, 150; Nutrition 123, 123L.
Select additional upper division units from any Animal Genetics, Animal Science, or Avian Sciences courses or other courses approved by your adviser.
Students in this specialization must substitute Avian Sciences 103, 121, and Neurobiology, Physiology, and Behavior 117 for the Animal Science 124 and Neurobiology, Physiology, and Behavior 121 and 121L requirement under Integrative Animal Biology.

Companion and Captive Animals 20

Animal Science 42, 142; Nutrition 122 or 123 and 123L; Animal Science 170.
Select additional units from any Animal Genetics, Animal Science or Avian Sciences course, or from Nutrition 115, 122, 123, 123L or other courses approved by your faculty adviser.

Equine Science 20

Animal Science 15, 115, 141 and one of Animal Science 125, 126 or 127.
Select additional units from any Animal Genetics or Animal Science course, or from Nutrition 115, 122, 123, 123L or other courses approved by your faculty adviser.

Laboratory Animals..... 23

Animal Science 42, 103, 140, Nutrition 123, 123L, Animal Science 104 or Neurobiology, Physiology, and Behavior 102, and Anatomy, Physiology and Cell Biology 100 or Neurobiology, Physiology, and Behavior 123.

Livestock and Dairy 20

Select two of Animal Science 143, 144, 146; Animal Science 145 or 147; Nutrition 115.
Select additional upper division units from any Animal Genetics, Animal Science or Avian Sciences course, or from Nutrition 122, 123, 123L or other courses approved by your faculty adviser.

Poultry 20

Avian Sciences 11, 100, 150; Animal Science 143; Avian Sciences 149 or Food Science and Technology 121; Nutrition 123, 123L.
Select additional upper division units from any Animal Genetics, Animal Science, Avian Sciences, or other courses approved by your faculty adviser.
Students in this specialization must substitute Avian Sciences 103, 121, and Neurobiology, Physiology, and Behavior 117 for the Animal Science 124 and Neurobiology, Physiology, and Behavior 121 and 121L requirement under Integrative Animal Biology.

Total Units for the Major 114-126

Minor Program Requirements:

The Department of Animal Science offers five minor programs open to students majoring in other disciplines who wish to complement their study programs with a minor in Animal Science. Some courses have required prerequisites not included as part of the minor, and students should plan accordingly.

UNITS

Animal Science—Animal Biology 20

Animal Science 15, 42, 41 and 41L, or 41 and 21 3-4
Animal Science 103 or 104..... 3-4
Animal Science 123, 124, or Neurobiology, Physiology, and Behavior 121 and 121L 4
Additional upper division courses 8-10
Select additional units to complete the 20-unit total from upper division Animal Science courses, Animal Genetics courses, Neurobiology, Physiology, and Behavior 121, 121L, Nutrition 115, 122, 123, 123L. Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.

Animal Science—Animal Genetics 20

Animal Science 15, 42, 41 and 41L, or 41 and 21 3-4
Animal Genetics 107, 111 9
Additional upper division courses 7-8
Select additional units to complete the 20-unit total from upper division Animal Science courses, Animal Genetics courses, Avian Science 103, Neurobiology, Physiology, and Behavior 121, 121L, Nutrition 115, 122, 123, 123L. Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.

Animal Science—Aquaculture 20

Animal Science 18..... 4
Animal Science 118, 119..... 8
Additional upper division courses 8
Select additional units to complete the 20-unit total from upper division Animal Science courses, Animal Genetics courses, Applied Biological Systems Technology 161, Nutrition 124, Wildlife, Fish, and Conservation Biology 121. Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.

Animal Science—Dairy/Livestock..... 20

Animal Science 41 and 41L or 21 4
Animal Science 104..... 4
Additional upper division courses 12
Select 4 or 8 units from Animal Science 143, 144, 146.
Select additional units to complete the 20-unit total from upper division Animal Science courses, Animal Genetics courses, Neurobiology, Physiology, and Behavior 121, 121L, Nutrition 115, 122, 123, 123L. Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.

Animal Science—Equine 21

Animal Science 15 3
Animal Science 103 or 104 3-4
Animal Science 115, 141 8
Animal Science 125 or 126 3
One additional upper division course..... 2-3
Select from upper division Animal Science courses, Animal Genetics courses, Neurobiology, Physiology, and Behavior 121, 121L, Nutrition 115, 122, 123, 123L. Variable unit courses (92, 99, 192, 197T, 198, 199) are not allowed for the completion of this requirement.

Minor Adviser. E.J. DePeters

Graduate Study. The Animal Biology Graduate Group offers a program of study and research leading to the M.S. or Ph.D, degree in Animal Biology. The chair of the Animal Biology Graduate Group is T. Berger

Graduate Advisers. S.S.O. Hung, and E.A. Maga

Courses in Animal Science (ANS)

Lower Division Courses

1. Domestic Animals and People (4)

Lecture—3 hours; laboratory—3 hours. Animal domestication and factors affecting their characteristics and distribution. Animal use for food, fiber, work, drugs, research and recreation; present and future roles in society. Laboratory exercises with beef and dairy cattle, poultry, sheep, swine, laboratory animals, fish, horses, meat and dairy products. GE credit: SciEng, Wrt.—I. (I.) Famula

2. Introductory Animal Science (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1 and Biological Sciences 1A recommended. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals and species used in aquaculture; the application of sciences to animal production. GE credit: SciEng, Wrt.—III. (III.) Murray

15. Introductory Horse Husbandry (3)

Lecture—3 hours. Prerequisite: course 2 recommended. Introduction to care and use of light horses emphasizing the basic principles for selection of horses, responsibilities of ownership, recreational use and raising of foals.—II. (II.) Roser

18. Introductory Aquaculture (4)

Lecture—3 hours; discussion—1 hour. Historical and contemporary aquacultural practices. Interaction between the aqueous culture environment and the biology of aquatic animals. Impact of economics and governmental policies on the development of aquaculture. Interaction of aquacultural practices with larger societal goals. GE credit: SciEng.—I. (I.) Kueltz

21. Livestock and Dairy Cattle Judging (2)

Laboratory—6 hours. Prerequisite: course 1 or 2 recommended. Evaluation of type as presently applied to light horses, meat animals and dairy cattle. Relationship between form and function, form and carcass quality, and form and milk production.—III. (III.) Van Liew

22A. Animal Evaluation (2)

Laboratory—3 hours; fieldwork—30 hours (total). Prerequisite: course 21 or the equivalent. Attendance at 3 one-day weekend field trips required. Domestic livestock species with emphasis on visual appraisal, carcass evaluation, and application of performance information. Emphasis on accurate written and oral descriptions of evaluations. Prerequisite to intercollegiate judging competition. Offered in alternate years. (P/NP grading only.)—(I.) Van Liew

22B. Animal Evaluation (2)
Laboratory—3 hours; fieldwork—30 hours (total). Prerequisite: course 22A or the equivalent. Attendance at 3 one-day weekend field trips required. Continuation of course 22A with emphasis on specific species: swine, beef cattle and sheep. Application of animal science principles to selection and management problem-solving scenarios. Prerequisite to intercollegiate judging competition. Offered in alternate years. (P/NP grading only.)—(II.) Van Liew

41. Domestic Animal Production (2)
Lecture—2 hours. Principles of farm animal management, including dairy and beef cattle, sheep, and swine. Industry trends, care and management, nutrition, and reproduction.—I. (I.) Mitloehner

41L. Domestic Animal Production Laboratory (2)
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 41 (may be taken concurrently). Animal production principles and practices, including five field trips to dairy cattle, beef cattle, sheep, and swine operations and campus labs. (P/NP grading only.)—I, II. (I, II.) Mitloehner, Van Liew

42. Introductory Companion Animal Biology (4)
Lecture—3 hours; discussion—1 hour. Companion animal domestication. Historical, contemporary perspectives. Legislation concerning companion animals. Selected topics in anatomy, physiology, genetics, nutrition, behavior and management. Scientific methods in studying the human-animal bond. Discussions: application of biological concepts to problems related to companion animals. GE credit: SciEng, Wrt.—II. (II.) Oberbauer

49A-J. Animal Management Practices (2)
Discussion—1 hour; laboratory—3 hours. The application of the principles of elementary biology to the management of a specific animal species. Among the topics offered: (A) Aquaculture, (B) Beef, (C) Dairy, (D) Goats, (E) Horses, (F) Laboratory Animals, (G) Meats, (H) Poultry, (I) Sheep, (J) Swine. Up to four different topics may be taken. (P/NP grading only.)—I, II, III. (I, II, III.)

90C. Research Group Conference (1)
Discussion—1 hour. Prerequisite: lower division standing, consent of instructor. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

92. Internship in Animal Science (1-12)
Internship—3-18 hours. Prerequisite: consent of instructor. Internship off and on campus in dairy, livestock, and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval form must be met. (P/NP grading only.)—I, II, III. (I, II, III.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

103. Animal Welfare (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: course 104 or Neurobiology, Physiology, and Behavior 102 or the equivalent or consent of instructor. The application of principles of animal behavior and physiology to assessment and improvement of the welfare of wild, captive, and domestic animals. Topics include animal pain, stress, cognition, motivation, emotions, and preferences, as well as environmental enrichment methods.—I. (I.) Mench

104. Principles of Domestic Animal Behavior (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A or 1B or the equivalent. Basic principles of animal behavior as applied to domesticated species. Emphasis will be placed on behavioral development and social behavior. External (exogenous) and physiological mechanisms influencing behavior will be discussed. GE credit: SciEng.

105. Domestic Animal Behavior (2)
Lecture—2 hours. Prerequisite: an introductory animal behavior course (e.g., course 104, Psychology 150, Neurobiology, Physiology, and Behavior 102) or consent of instructor. Application of the principles of animal behavior in the management of domestic animals. Includes reproductive behavior, feeding behavior, agonistic behavior, animal handling and human-animal interactions. GE credit: SciEng.—II. (II.) Tucker

106. Domestic Animal Behavior Laboratory (2)
Laboratory—6 hours. Prerequisite: course 104 or the equivalent. Research experience with the behavior of large domestic animals. Experimental design, methods of data collection and analysis, and reporting of experimental results. GE credit: SciEng, Wrt.—III. (III.) Tucker

115. Advanced Horse Production (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 15; Biological Sciences 101; Nutrition 115; Neurobiology, Physiology, and Behavior 101; or consent of instructor. Feeding, breeding, and management of horses; application of the basic principles of animal science to problems of production of all types of horses. Designed for students who wish to become professionally involved in the horse industry. GE credit: SciEng.—I. (I.) Roser

118. Fish Production (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Wildlife, Fish, and Conservation Biology 120 and 121. Current practices in fish production; relationship between the biological aspects of a species and the production systems, husbandry, management, and marketing practices utilized. Emphasis on species currently reared in California.—II. (II.) Doroshov

119. Invertebrate Aquaculture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1B. Management, breeding and feeding of aquatic invertebrates; application of basic principles of physiology, reproduction, and nutrition to production of mollusks and crustaceans for human food; emphasis on interaction of species biology and managerial techniques on production efficiencies.

120. Principles of Meat Science (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A. Anatomical, physiological, developmental, and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology, and public health issues associated with meat products. (Same course as Food Science and Technology 120.) GE credit: SciEng.

120L. Meat Science Laboratory (2)
Discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1A; course 120 (may be taken concurrently). Laboratory exercises and student participation in transformation of live animal to carcass and meat, structural and biochemical changes related to meat quality, chemical and sensory evaluation of meat, and field trips to packing plant and processing plant. (Same course as Food Science and Technology 120L.)

123. Animal Growth and Development (4)
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Animal Biology 103 or Biological Sciences 103. Growth and development of animals from conception to maturity, viewed from practical and biological perspectives; includes genetic, metabolic, nutritional control of cell and organism function. GE credit: SciEng.—III. (III.) Sainz

124. Lactation (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 101; Animal Biology 103 (may be taken concurrently); or the equivalent background knowledge. Consideration of the biochemical, genetic, physiological, nutritional, and structural factors relating to mammary gland development, the initiation of lactation, the composition of milk and lactational performance. GE credit: SciEng, Wrt.—II. (II.) Hovey

125. Equine Exercise Physiology (3)
Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 101. Distance learning class broadcast from Cal Poly, Pomona, on basic and applied physiology of the exercising horse. Includes physiological systems, gait analysis, lameness, pharmacology, sports medicine; sport horse performance evaluation and conditioning. (Students and instructor have two-way communication capabilities.)

126. Equine Nutrition (3)
Lecture—3 hours. Prerequisite: course 15, Nutrition 115. Distance learning class broadcast from Cal Poly, Pomona and CSU Fresno on equine nutrition. Includes equine digestion, digestive physiology, diet development and evaluation, and the relationship of the topics to recommended feeding practices and nutritional portfolios.

127. Advanced Equine Reproduction (3)
Lecture—3 hours. Prerequisite: an upper division physiology course (e.g., Neurobiology, Physiology, and Behavior 101) and an advanced horse production and management course (e.g., course 115). Distance learning course that provides in-depth knowledge of the reproductive physiology, anatomy and endocrinology of the mare and stallion. Emphasis on structure/function relationships as they are applied to improving equine reproductive management and efficiency.—III. (III.) Roser

128. Agricultural Applications of Linear Programming (4)
Lecture—2 hours; laboratory—2 hours; discussion—1 hour. Prerequisite: upper division standing and Agricultural Systems and Environment 21 or the equivalent. Applications of linear programming in agriculture, emphasizing resource allocation problems and decision making. Problems include crop production, ration formulation, and farm management. Hands-on experience in developing linear programs and interpreting the results.—II. (II.) Fadel

129. Environmental Stewardship in Animal Production Systems (3)
Lecture—3 hours. Prerequisite: Biological Sciences 10 or 1A and 1B, Chemistry 2A, 2B, 8A, 8B. Management principles of environmental stewardship for grazing lands, animal feeding, operations and aquaculture operations; existing regulations, sample analyses, interpretation and utilization of data, evaluation of alternative practices, and policy development.—II. Meyer

131. Reproduction and Early Development in Aquatic Animals (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Molecular and Cellular Biology 150; Wildlife, Fish, and Conservation Biology 120, 121; or consent of instructor. Physiological and developmental functions related to reproduction, breeding efficiency and fertility of animals commonly used in aquaculture.—III. (III.) Doroshov

136A. Techniques and Practices of Fish Culture (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2. Daily care and maintenance of fish in residential aquariums, research and commercial facilities. Biological and environmental factors important to sound management of fish. Laboratories focus on fish culture and include growth trials. Not open for credit to students who have completed course 136.—I. (I.) Hung

136B. Techniques and Practices of Avian Culture (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2. Daily care and maintenance of birds for research, commercial production, and companion or hobby uses. Biological and environmental factors important to sound management of birds. Laboratories focus on bird husbandry, management and care, and include growth trials.—III. (III.) Hung

137. Animal Biochemistry Laboratory (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: Animal Biology 102 or Biological Sciences 102 or the equivalent. Chemical and biochemical methods, and instruments commonly used in animal science. Wet chemical methods, UV/visible and atomic absorption spectrophotometry, thin-layer and gas-liquid chromatography, commercial chemical kits. Attention to safety.—I. (I.) Hung

140. Management of Laboratory Animals (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 101. Laboratory animal management procedures in view of animal physiology, health and welfare, government regulations, and experimental needs. Clinical techniques using rodents and rabbits as models.—I. (I.)

141. Equine Enterprise Management (4)
Lecture/discussion—4 hours. Prerequisite: course 115; Economics 1A, 1B recommended. Examination of the concepts and principles involved in the operation of an equine enterprise. Essential aspects of equine enterprise management, including equine law, marketing, cash flow analysis, and impact of state and federal regulations. GE credit: SocSci, Wrt.—II.

142. Companion Animal Care and Management (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 42, Biological Sciences 101, Neurobiology, Physiology, and Behavior 101; Animal Biology 102 and 103 recommended. Management and production of companion animals. Integration of the disciplinary principles of behavior, genetics, nutrition, and physiology as related to the care of companion animals.—I. (I.) Oberbauer

143. Pig and Poultry Care and Management (4)
Lecture—3 hours; laboratory—3 hours; Saturday field trips. Prerequisite: Nutrition 115, Neurobiology, Physiology, and Behavior 101. Care and management of swine, broilers and turkeys as related to environmental physiology, nutrition and metabolism, disease management and reproduction. Offered in alternate years.—(I.) King

144. Beef Cattle and Sheep Production (4)
Lecture—3 hours; laboratory—3 hours; one or two Saturday field trips. Prerequisite: course 41, Animal Genetics 107, Nutrition 115, or consent of instructor; a course in Range Science and a course in microcomputing are recommended. Genetics, physiology, nutrition, economics and business in beef cattle and sheep production. Resources used, species differences, range and feedlot operations. Emphasis on integration and information needed in methods for management of livestock enterprises.—III. (III.) Sainz

145. Meat Processing and Marketing (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 143 or 144 or consent of instructor. Distribution, processing and marketing of meat and meat products. Meat and meat animal grading and pricing. Government regulations and social/consumer concerns. Future trends and impact on production management practices. Includes poultry.—(II.)

146. Dairy Cattle Production (4)
Lecture—3 hours; laboratory—3 hours; one mandatory Saturday field trip. Prerequisite: course 124, Animal Genetics 107, and Nutrition 115, or consent of instructor. Scientific principles from genetics, nutrition, physiology, and related fields applied to conversion of animal feed to human food through dairy animals. Management and economic decisions are related to animal biology considering the environment and animal well-being. GE credit: SciEng, Wrt.—III. (III.) DePeters

147. Dairy Processing and Marketing (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 146 or consent of instructor. Examination of distribution systems, processing practices, product quality, impact of government policy (domestic and foreign), marketing alternatives, and product development.

148. Enterprise Analysis in Animal Industries (4)
Lecture/discussion—4 hours. Prerequisite: course 141 or 145 or 147 or consent of instructor. Examination and application of decision making and problem solving in the production enterprise. The areas of production analysis, problem solving, risk analysis and cost-benefit analysis will be examined in terms of the total enterprise. GE credit: SocSci, Wrt.—III. (III.)

149. Farrier Science (3)
Lecture—3 hours. Prerequisite: course 115. Distance learning class broadcast from California Polytechnic State University San Luis Obispo, California Polytechnic State University Pomona, and California State University Fresno. In-depth examination of the structure-function relationship of the equine hoof and how it relates to conformation, injury, and performance.—III. (III.)

149L. Farrier Science Laboratory (1)
Laboratory—3 hours. Prerequisite: course 149 (may be taken concurrently) or consent of instructor. The art and science of horseshoeing in equine related fields. Proper use of the tools, materials and techniques in the fabrication of shoes and safe preparation of the hoof for application of shoes. (P/NP grading only.)—III. (III.)

170. Ethics of Animal Use (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: any basic course in composition or speech. Ethical issues relating to animal use in contemporary society. Integration of philosophical theories with scientific evidence relating to animal behavior, mentality, and welfare. Uses of animals in agriculture, research, and as companions. Ethical responsibilities regarding wildlife and the environment. GE credit: SocSci, Wrt.—III. (III.) Mench

190C. Research Group Conference (1)
Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship in Animal Science (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Internship off and on campus in dairy, livestock and aquaculture production, research and management; or in a business, industry, or agency associated with these or other animal enterprises. All requirements of Internship Approval Form must be met. (P/NP grading only.)—I, II, III. (I, II, III.)

194. Research in Animal Science (3)
Laboratory—6 hours; discussion—1 hour. Prerequisite: upper division standing, course 193, one laboratory course in animal biology and consent of instructor. Research with a faculty mentor. Weekly discussion and laboratory on specific research topic. May include a seminar to research group. Choose from sections: (1) Animal Behavior; (2) Animal Genetics; (3) Animal Nutrition; (4) Animal Physiology. May be repeated for credit for a total of four times.—I, II, III. (I, II, III.)

194HA-194HB-194HC. Undergraduate Honors Thesis in Animal Science (4-4-4)
Lecture—1 hour; laboratory—9 hours. Prerequisite: Neurobiology, Physiology, and Behavior 101, Animal Biology 103; minimum cumulative GPA of 3.200 and selection by the Honors Selection Committee. Students will carry out a research project (chosen from faculty-suggested or approved proposals) during the academic year under the guidance of a faculty member. Upon completion, student will write a thesis and present a public seminar describing his/her research. (Deferred grading only, pending completion of sequence.)

197T. Tutoring in Animal Science (1-2)
Tutorial—1-2 hours. Prerequisite: Animal Science or related major, advanced standing, consent of instructor. Tutoring of students in lower division animal science courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. May be repeated one time for credit. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200. Strategies in Animal Production (4)
Lecture/discussion—4 hours. Prerequisite: consent of instructor. Examines the forces and issues in animal agriculture through the strategic management process.

206. Models in Agriculture and Nutrition (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 16B; Statistics 108. Basic model building principles and techniques for statistical and systems simulation models. Optimization techniques for non-linear experimental designs and management models are presented. Quantitative analysis and evaluation of linear and non-linear equations used in agriculture and nutrition.

259. Literature in Animal Science (1)
Seminar—1 hour. Prerequisite: graduate standing. Critical presentation and analysis of recent journal articles in animal science. May be repeated for credit up to nine times. (S/U grading only.)

290. Seminar (1)
Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, and physiology as they apply to animal science. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Research Group Conference (1)
Discussion—1 hour. Prerequisite: graduate standing. Weekly conference on research problems, progress and techniques in the animal sciences. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

291. Current Research in Animal Science (1)
Seminar—1 hour. Prerequisite: graduate standing. Current research in animal science explored at weekly seminars presented by guest lecturers. Discussion of research presented. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

297. Supervised Teaching in Animal Science (2)
Supervised teaching—6 hours. Prerequisite: consent of instructor. Practical experience in teaching Animal Science at the University level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. An evaluation letter sent to the Graduate Adviser with a copy to the student. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
Prerequisite: consent of instructor. (Sect. 1, 2, 3—letter grading; from Sect. 4 on—S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Animal Science and Management

(College of Agricultural and Environmental Sciences)

Master Adviser. J.G. Fadel

Advising Center for the major (including peer advising) is located in 1202 Meyer Hall (530) 754-7915. Each student will be assigned a faculty adviser through this office upon entering the major. *http://asac.ucdavis.edu*

The Major Program

The Animal Science and Management major combines a thorough education in the basic biology of domestic animal species with a strong background in agricultural economics. Graduates of this interdisciplinary major will be well positioned to adjust to our rapidly changing world and job market.

The Program. The interdisciplinary program in Animal Science and Management combines a fundamental background in the natural sciences (chemistry, biology, physiology, nutrition, genetics, mathematics, and behavior), with an understanding of economics and humanities. After completing preparatory courses, students focus on both the animal species that interest them (horses, cattle, sheep, companion animals, goats, fish, crustaceans or mollusks, among others) and principles of managerial economics (marketing, finance, business organization or systems analysis). Students preparing for medical or veterinary school can meet professional entrance requirements with those of this major if they plan ahead.

Career Alternatives. Job opportunities for successful graduates are plentiful and include positions with banking and financial institutions, agribusiness, Peace Corps, and farms of all scales. Most Animal Science and Management graduates are well prepared for professional study (medical, law, veterinary, and graduate business schools) as well as graduate research programs leading to the M.S. or Ph.D. degrees. Advanced degrees open doors to work as extension specialists, farm advisers, and teachers, and prepare students for international service.

B.S. Major Requirements:

UNITS

Written and Oral Expression 8

Select two courses (if not selected for English college requirement) from Communication 130, 134, 135, 136, 140; Nematology 150; University Writing Program 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 104A, 104B, 104C, 104D, 104E, 104F 8

Preparatory Subject Matter 69-72

Animal Science 1 and 2..... 8
Biological Sciences 2A, 2B, and 2C; or Biological Sciences1A, 1B, and one of Biological Sciences1C, Plant Sciences 2, 110A, 112, or Environmental Horticulture 6..... 13-15
Chemistry 2A, 2B, 8A, 8B..... 16
Plant Sciences 21 or Computer Science Engineering 15..... 3-4
Economics 1A, 1B; Management 11A, 11B..... 16
Mathematics 16A, 16B, and 16C or the more advanced mathematics courses..... 9
Plant Sciences 120, Statistics 100 or 103, or other courses in quantitative skills with prior approval of the Master Adviser..... 4

Depth Subject Matter..... 27-30

Biological Sciences 101..... 4
Nutrition 115..... 4
Neurobiology, Physiology, and Behavior 101..... 5
Business Management..... 14-17
Agricultural and Resource Economics 100A;
One course from Agricultural and Resource Economics 113, 130, 136, 138;
One course from Agricultural and Resource Economics 120, 132, 140, 145, *157*;
Plus one course from Animal Science 128 or Agricultural and Resource Economics *155*.

Area of Specializations..... 14-16

Choose one area of specialization below.

Aquatic Animals..... 16

Animal Science 18, 118 or 119, 131, and 148.

Companion Animals..... 16

Animal Science 42, 140, 142, and 148.

Dairy..... 15

Animal Science 41, 41L, 146, *147*, and 148.

Equine..... 15

Animal Science 15, 115, 141, and 148

Livestock..... 16

Animal Science 41, 41L, 143 or 144, 145, and 148.

Poultry..... 15

Avian Sciences 11, Animal Science 143, 145, and 148

Individualized..... 14-16

Students may, with prior approval of their adviser and the Master Adviser, design their own individualized specialization within the major. The specialization will consist of 4 to 6 courses with one of the courses being Animal Science 148. The other courses will include an introduction, care and management, and processing and/or marketing aspects of the animal of interest.

Restricted Electives..... 8-10

At least two additional courses (minimum 8 units; duplicate from Depth courses not counted) selected with approval of adviser from: Agricultural and Resource Economics 18, 112, 113, 118, 120, 130, 132, 136, 138, 140, 142, 143, 144, 145, 150, 155, *157*, 171A, 171B, 176; Animal Science 103, 104, 105, 106, 115, 118, 119, 120, 120L, 123, 124, 125, 126, 127, 128, 129, 131, 136, 137, 140, 141, 142, 143, 144, 145, 146, 147, 149, 170, 192, 194, 194H; Avian Sciences 100, 103, 115, 121, 123, 149, 150; Animal Genetics 101, 105, *107*, 111; Nutrition 122, 123, 123L, 124; Animal Biology 102 (strongly recommended), 103; Computer Science Engineering 124; Management 100; Neurobiology, Physiology, and Behavior 117, 121, 121L, 130; Wildlife, Fish, and Conservation Biology 120, 120L, 130.

Total Units for the Major..... 126-136

Anthropology

(College of Letters and Science)

_____, Chairperson of the Department

Department Office. 330 Young Hall
(530) 752-0745/0746;
http://www.anthroplogy.ucdavis.edu

Faculty

Robert L. Bettinger, Ph.D., Professor
Monique Borgerhoff Mulder, Ph.D., Professor
Christyann Darwent, Ph.D., Associate Professor
Marisol de la Cadena, Ph.D., Associate Professor
Timothy K. Choy, Ph.D., Assistant Professor
(Science and Technology Studies)
Donald L. Donham, Ph.D., Professor
Joseph Dumit, Ph.D., Associate Professor
(Science and Technology Studies)
Jelmer W. Eerkens, Ph.D., Associate Professor
Cristiana L. M. Giordano, Ph.D., Assistant Professor
Lynne A. Isbell, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Suad Joseph, Ph.D., Professor
(Women and Gender Studies)
Alan Klima, Ph.D., Associate Professor
Andrew J. Marshall, Ph.D., Assistant Professor
Richard McElreath, Ph.D., Associate Professor
Suzana M. Sawyer, Ph.D., Associate Professor
Janet S. Shibamoto Smith, Ph.D., Professor
David Glenn Smith, Ph.D., Professor
James Smith, Ph.D., Associate Professor
Smriti Srinivas, Ph.D., Professor
Teresa E. Steele, Ph.D., Assistant Professor
Timothy D. Weaver, Ph.D., Assistant Professor
Bruce P. Winterhalder, Ph.D., Professor
Aram A. Yengoyan, Ph.D., Professor
Li Zhang, Ph.D., Professor

Emeriti Faculty

David J. Boyd, Ph.D., Professor Emeritus
Richard T. Curley, Ph.D., Senior Lecturer Emeritus
William G. Davis, Ph.D., Professor Emeritus
Jack D. Forbes, Ph.D., Professor Emeritus
Alexander H. Harcourt, Ph.D., Professor Emeritus
Sarah B. Hrdy, Ph.D., Professor Emerita
Henry M. McHenry, Ph.D., Professor Emeritus
(UC Davis Prize for Undergraduate Teaching and Scholarly Achievement)
David L. Olmsted, Ph.D., Professor Emeritus
Peter S. Rodman, Ph.D., Professor Emeritus
Carol A. Smith, Ph.D., Professor Emerita
Carolyn F. Wall, Senior Lecturer Emerita

The Major Program

Anthropology is the systematic study of human beings. The student of anthropology learns about human biology, ecology, and social life—past and present—and gains a broad understanding of humans and societies. It is a diverse field, and the courses, faculty, and degree programs at UC Davis are subdivided into two wings—*Evolutionary* and *Sociocultural*.

Evolutionary. *Evolutionary anthropologists* are united by their common application of science to understand the behavior, ecology, history, and evolution of humans and non-human primates, as individuals and as societies. The many useful approaches to these topics bring together archaeology, human behavioral ecology, molecular anthropology, paleoanthropology, biogeography, conservation biology, and primatology. *Archaeology* is the study of the history or prehistory by analysis of a people's artifacts, or their material culture, with the goal of constructing culture history and reconstructing human behavior. *Human behavioral ecology* is the study of how variation in ecology and social organization can help us understand variation in human behavior. *Molecular anthropology* uses DNA to study the genetic relationships among different populations and the adaptive significance of specific genetic traits. *Paleoanthropology* uses comparisons among fossilized remains to understand what morphological changes occurred during the course of human evolution. *Biogeography* investigates the biology behind the geographic distribution of species, and also of human cultures. *Conservation biology* explores the causes of loss of biological diversity—in this department, it focuses on threatened non-human primates and the conservation of natural resources by a rapidly growing population. *Primatology* is the study of behavior, ecology and morphology of primates to address questions about the evolution and function of behavioral and morphological patterns in nonhuman primates and to test models of the origins of human morphology and behavior.

Sociocultural. *Sociocultural anthropologists* study the varied ways in which people around the world organize their lives and interpret the circumstances in which they operate. Their principle method is extended field research, which combines attention to global issues with the close study of human relations

and culture. Among the themes addressed in the department's undergraduate courses are globalization and transnationalism; human ecology and environmental change; the global spread of media and technology; migration, multiculturalism and urban life; colonialism, neocolonialism and development; race, class and gender; rebellion, resistance and the cultural politics of everyday life; language use and discourse; and self, identity and family. The track in sociocultural anthropology thus offers an unusually rich set of resources for understanding and engaging pressing issues in a globalizing world characterized by new forms of international culture and community as well as by increasing material inequality and political volatility.

The Program. The Bachelor of Arts program is divided into two tracks, *Sociocultural* and *Evolutionary*, which parallel the two wings described above. Students interested in the study of recent and contemporary human languages and societies should follow the Sociocultural Track. To obtain a A.B. degree in sociocultural anthropology, each student is required to complete courses that provide *(1)* foundational skills, *(2)* language and cultural skills, *(3)* comprehensive skills, and *(4)* specialized skills. Students interested in the study of archaeology; primate studies; or human biology, ecology or origins should follow the Evolutionary Track. The B.A. degree offered by the Evolutionary Track provides general training in anthropology from an evolutionary perspective. The Evolutionary Track also offers a B.S. degree that requires more rigorous lower division coursework in math and science than the A.B. degree and upper division coursework in biological anthropology and closely related disciplines.

Students in both tracks are encouraged to gain practical experience through courses taken while studying abroad (under the administration of the Education Abroad Center) and through internships performed for credit (under the administration of the Internship and Career Center). Students showing exceptional ability are welcome to seek permission from instructors to participate in graduate seminars offered by the department and to have these courses count towards the fulfillment of upper division requirements for the major.

Career Alternatives. A Bachelor of Arts degree in Anthropology is suited for students seeking a solid liberal arts education. With its broad goal to facilitate understanding across lines of cultural difference, sociocultural anthropology prepares students for lives that are influenced by increasingly pervasive cultural exchange, as well as cultural conflict, around the world. The program serves as excellent preparation for careers in which inter-cultural skills are increasingly needed, including social and environmental activism, business, diplomacy and social administration, journalism, law, education and international relations. Students that focus on evolutionary processes will be well prepared to enter fields such as medical or health anthropology, museum studies, cultural resource management and wildlife conservation. A Bachelor of Science degree in Anthropology provides suitable pre-medical, predental, and pre-veterinary training, and the educational background for further training in the health professions, biological/evolutionary sciences and forensic investigation. The A.B. or B.S. degree in anthropology with appropriate courses in education is good preparation for high school teaching in social, biological and natural sciences. An anthropology degree also provides the foundation for advanced study leading to careers in college-level teaching and research.

A.B. Major Requirements:

UNITS

Evolutionary Track:

Preparatory Subject Matter.....19-21

Anthropology 1, 2, 3 12
Anthropology 15 or 23..... 4-5
Anthropology 13, Statistics 13, 32, 100 or 102..... 3-4

Depth Subject Matter 42-47

Two courses from Anthropology 101, 102, 103, 105, 122A, 128A, 154A, 154B, 158, 178 7-9
Anthropology 153 or 157 3-5
Anthropology 151 or 152 4-5
One course from Anthropology 170, 171, 172, 173, 176, 180 or 184 4
One course from sociocultural track in consultation with evolutionary track undergraduate adviser 4
Select 20 additional units from any upper division evolutionary track Anthropology courses (see list below) chosen in consultation with an evolutionary track undergraduate adviser 20

Total Units for the Major 61-68

Note: Evolutionary track courses at the upper division level are courses 101, 102, 103, 105, 122A, 128A, and 151 to 184

Sociocultural Track:

Preparatory Subject Matter.....20-22

Anthropology 2 4
Two courses from: Anthropology 1, 3, or 4 8
Select one of the following three options:
(1) Two additional quarters of the foreign language used to meet the L&S language requirement.....8-10
(2) Two additional lower division sociocultural track courses.....8-10
(3) Eight quarter units Study Abroad..... 8

Depth Subject Matter 38-41

Anthropology 100, 110 8
Two upper division area-focus sociocultural track courses 8
Select one of the following two options in consultation with, and only after prior written approval of, sociocultural track undergraduate adviser (see list below identifying upper division sociocultural; see list above identifying evolutionary track courses):
(1) Six additional upper division anthropology courses (two courses may be in the evolutionary track; and up to six units can be internships) 24-28
(2) Six additional upper division courses that may combine four sociocultural track courses with up to two related courses in a single academic discipline (including but not limited to: African American and African Studies, American Studies, Art Studio, Art History, Asian American Studies, Chicana/o Studies, Communication, Community and Regional Development, Economics, East Asian Studies, History, Linguistics, Music, Native American Studies, Nature and Culture, Philosophy, Political Science, Psychology, Religious Studies, Sociology, Textiles and Clothing, Theatre and Dance, Women and Gender Studies) 24-28

Total Units for the Major 60-66

Note: Sociocultural track courses at the upper division level are those with numbers from 100 to 149B, with the exception of 101, 103, 105, 128A, and 141B. Area-focus sociocultural track courses are those that refer in their titles to one or more peoples or regions of the world.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter.....54-60

Anthropology 1, 2, 3 12
Biological Sciences 2A, 2B, 2C..... 14
Chemistry 2A, 2B;, and 8A, 8B, or 118A, 118B. 16-18
Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C 9-12
Anthropology 13, Statistics 13, 32, 100, or 102 3-4

Depth Subject Matter 45

Anthropology 152, 153, 154A.....15
Three additional courses in anthropology chosen in consultation with evolutionary track undergraduate adviser 8-12
Biological Sciences 101 4
Evolution and Ecology 100.....4
Additional units from the list below to achieve a minimum of 45 upper division units..... 10-14
Anthropology 101, 102, 103, 105, 122A, 128A, 151, 154B, 154BL, 155, 156, 157, 157L, 158, 159, 180; Anatomy, Physiology and Cell Biology 100; Biological Sciences 102, 103; Cell Biology and Human Anatomy 101, 101L; Environmental Science and Policy 100; Evolution and Ecology 101, 102, 103, 104, 105, 138, 141, 147, 149, 175; Exercise Science 103, 115; Geology, 107, 107L, 108, 144, 146; History and Philosophy of Science 131; Molecular and Cellular Biology 120L, 121, 150, 150L, 160L, 161, 162, 163, 164; Neurobiology, Physiology, and Behavior 101, 101L, 102, 123, 124, 150, 152; Psychology 101, 113, 121, 122, 123, 124; Statistics 104, 106, 108, 130A, 130B; Wildlife, Fish, and Conservation Biology 141, 154

Total Units for the Major 99-105

Recommended

Anthropology 5, 15, 50; Geology 1; Psychology 1

Minor Program Requirements:

UNITS

Anthropology 18-30

General emphasis.....19-21

One course from Anthropology 101, 102, 103, 105, 122A, 128A, 151, 152, 153, 154A, 155, 156, 157, 158, 159.....3-5
One course from Anthropology 170, 171, 172, 173, 176, 180, 183, 184 4
One course from Anthropology 140A through 149B, 178 or any other sociocultural track course that refers in its title to one or more peoples or regions of the world 4
Two courses from Anthropology 100 through 139BN, excluding 101, 103, 105, 128A, and 141B.....8

Archaeology Emphasis.....20-25

Anthropology 170 4
Two courses from Anthropology 172, 173, 174 175, 176, 177, 178 8
Two courses from Anthropology 156A, 156B, 171, 180, 181, 182, 183, 184 8-13

Evolutionary emphasis.....18-30

Any five upper division Evolutionary Anthropology courses chosen in consultation with an evolutionary track adviser.

Sociocultural emphasis.....19-21

Anthropology 100 4
One upper division area-focus sociocultural track course 4
(area-focus sociocultural track courses are those that refer in their titles to one or more peoples or regions of the world)
Two courses from Anthropology 102 through 139BN, excluding 103, 105, and 128A.....8
One additional upper division Anthropology course chosen in consultation with sociocultural track undergraduate adviser.....3-5

Honors Program. Candidates for high or highest honors in Anthropology must write a senior thesis under the direction of a faculty member. The thesis project will have a minimum duration of two quarters. Honors candidates must take at least six units of Anthropology 194H. Only students who, at the end of their junior year (135 units), have attained a cumulative grade point average of 3.500 in Anthropology courses will be eligible for the honors pro-

gram. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

Teaching Credential Subject Representative. _____; see the Teaching Credential/M.A. Program on page 114.

Graduate Study. The Department offers a program of study leading to the M.A. and Ph.D. degrees in Anthropology. Further information regarding graduate study may be obtained at the Department office and at Graduate Studies.

Courses in Anthropology (ANT)

Lower Division Courses

1. Human Evolutionary Biology (4)
Lecture—3 hours; discussion—1 hour. Processes and course of human evolution; primatology; biological and social diversity within Homo sapiens; human paleontology. GE Credit: SciEng, Div, Wrt.—I, II, III. (I, II, III.) Marshall, McElreath, Weaver

2. Cultural Anthropology (4)
Lecture—3 hours; discussion—1 hour. Introduction to cultural diversity and the methods used by anthropologists to account for it. Family relations, economic activities, politics, gender, and religion in a wide range of societies. Current problems in tribal and peasant societies. GE credit: SocSci, Div, Wrt.—I, II, III. (I, II, III.) Yengoyan

3. Introduction to Archaeology (4)
Lecture—3 hours; discussion—1 hour. Development of archaeology as an anthropological study; objectives and methods of modern archaeology. GE credit: SocSci, Div.—I, II, III. (I, II, III) Bettinger, Darwent Steele

4. Introduction to Anthropological Linguistics (4)
Lecture—3 hours; discussion—1 hour. Exploration of the role of language in social interaction and world view, minority languages and dialects, bilingualism, literacy, the social motivation of language change. Introduction of analytical techniques of linguistics and demonstration of their relevance to language in sociocultural issues. GE credit: SocSci, Div, Wrt.

5. Proseminar in Biological Anthropology (4)
Seminar—3 hours; term paper. Prerequisite: course 1 and consent of instructor. Course primarily for majors. Integration of related disciplines in the study of biological anthropology through discussion and research projects. Principal emphasis in human adaptation to the environment. GE credit: SciEng, Wrt.—Isbell

13. Scientific Method in Physical Anthropology (4)
Lecture—2 hours; laboratory/discussion—1 hour; fieldwork—1 hour. Skills for scientific thinking; designing, implementing, analyzing, interpreting, presenting, and criticizing research. Collection and analysis of original data. Basic statistical methods. GE credit: SocSci, Wrt.—McElreath

15. Behavioral and Evolutionary Biology of the Human Life Cycle (5)
Lecture—3 hours; discussion—1 hour; term paper. Introduction to the biology of birth, childhood, marriage, the family, old age, and death. Examines comparative characteristics of nonhuman primates and other animals as well as cross-cultural variation in humans by study of selected cases. GE credit: SciEng, Div, Wrt.

20. Comparative Cultures (4)
Lecture—3 hours; discussion—1 hour. Introduction to the anthropological study of cultural diversity. Case studies of eight societies will be presented to illustrate and compare the distinctive features of major cultural regions of the world. Concludes with a discussion of modernization. GE credit: SocSci, Div.—Sawyer

23. Introduction to World Prehistory (4)
Lecture—3 hours; discussion—1 hour. Broadly surveys patterns and changes in the human species' physical and cultural evolution from earliest evidence for "humanness" to recent development of large-scale complex societies or "civilizations." Lectures emphasize use of archaeology in reconstructing the past. GE credit: SocSci, Div, Wrt.—Darwent, Eerkens

24. Ancient Crops and People (4)
Lecture—3 hours; discussion—1 hour. The archaeological evidence for domestication of plants and the origins of agricultural societies. Anthropological context of agriculture and the effects on sexual division of labor, social inequality, wealth accumulation, warfare, human health, and sedentism. GE credit: SocSci, Div, Wrt.—Eerkens

30. Sexualities (4)
Lecture/discussion—4 hours. Introduction to the study of sexuality, particularly to the meanings and social organization of same-sex sexual behavior across cultures and through time. Biological and cultural approaches will be compared, and current North American issues placed in a wider comparative context.—Donham

32. Drugs, Science and Culture (4)
Lecture—3 hours; discussion—1 hour. Drugs, politics, science, society in a cultural perspective: emphasis on roles of science, government and the media in shifting attitudes toward alcohol, marijuana, Prozac and other pharmaceuticals; drug laws, war on drugs and global trade in sugar, opium, cocaine. (Same course as Science and Technology Studies 32.) GE Credit: Div, SocSci, Wrt.—Dumit

34. Cultures of Consumerism (4)
Lecture/discussion—4 hours; term paper. Aspects of modern consumer cultures in capitalist and socialist countries. Transformations of material cultures over the past century. Case studies on the intersections of gender, class, and culture in everyday consumption practices. Offered in alternate years. GE Credit: Div, SocSci, Wrt.

50. Evolution and Human Nature (4)
Lecture—3 hours; discussion—1 hour. Evolutionary analyses of human nature, beginning with Lamarck, Darwin, Spencer and contemporaries, and extending through social Darwinism controversies to contemporary evolutionary anthropology research on human diversity in economic, mating, life-history, and social behavior. GE credit: SocSci, Div, Wrt.—Winterhalder

54. Introduction to Primatology (4)
Lecture/discussion—3 hours; term paper. Basic survey of the primates as a separate order of mammals; natural history and evolution of primates; consideration of hypotheses for their origin.—Isbell

Upper Division Courses

100. Theory in Social-Cultural Anthropology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Discussion of the theoretical and philosophical developments in cultural anthropology from the 19th century to the present. Not open for credit to students who have completed course 137. (Former course 137.) GE credit: SocSci.—I (I.) Donham

101. Ecology, Nature, and Society (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or Environmental Science and Policy 30 or Evolution and Ecology 100 or Biological Sciences 101. Interdisciplinary study of diversity and change in human societies, using frameworks from anthropology, evolutionary ecology, history, archaeology, psychology, and other fields. Topics include population dynamics, subsistence transitions, family organization, disease, economics, warfare, politics, and resource conservation. (Same course as Environmental Science and Policy 101.) GE credit: SocSci, Div, Wrt.—Borgerhoff, Mulder

102. Cultural Ecology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one lower division course in the social sciences, upper division standing. Comparative survey of the interaction between diverse human cultural systems and the environment. Primary emphasis given to people in rural and relatively undeveloped environments as a basis for interpreting complex environments. Not open for credit to students who have completed course 133. (Same course as Environmental Science and Policy 102.) GE credit: SocSci, Div, Wrt.—III. (III.) Orlove

103. Indigenous Peoples and Natural Resource Conservation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Geology 1 or Environmental Science and Policy 30. Integration of the interests of resident and indigenous peoples with the conservation of natural resources and ecosystems, using case study examples from both the developing and the developed world. Not open for credit to students who have completed course 121N. (Former course 121N.)—Borgerhoff, Mulder

104N. Cultural Politics of the Environment (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Political economy of environmental struggles. Relationship between social inequality (based on race, class, and/or gender) and ecological degradation. Articulation of local peoples, national policy, and the international global economy in the contestation over the use of environmental resources. Not open for credit to students who have completed course 134N. (Former course 134N.) GE credit: SocSci, Div.—Sawyer

105. Evolution of Societies and Cultures (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2 or Environmental Science and Policy 30 or Evolution and Ecology 100 or Biological Sciences 101. Interdisciplinary study of social and cultural evolution in humans. Culture as a system of inheritance, psychology of cultural learning, culture as an adaptive system, evolution of maladaptations, evolution of technology and institutions, evolutionary transitions in human history, coevolution of genetic and cultural variation. Only two units of credit to students who have completed Environmental Science and Policy 101 or course 101 prior to fall 2004. (Same course as Environmental Science and Policy 105.) GE credit: SocSci, Wrt.—McElreath

109. Visualization in Science: A Critical Introduction (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 2 or Science & Technology Studies 1 or Science & Technology Studies 20. Anthropological approaches to scientific visualization techniques, informatics, simulations. Examination of different visualization techniques toward understanding the work involved in producing them, critical assessment of their power and limits, especially when visualizations are used socially to make claims. Offered in alternate years. (Same course as Science & Technology Studies 109.) GE credit: SocSci, Wrt.—Dumit

110. Language and Sociocultural Anthropology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. The role of language analysis and linguistic theory in the development of sociocultural anthropology. Language, culture, and thought; the linguistic accomplishment of social action; language ideology; language and social power. Language as cultural mediator of politicoeconomic process. GE credit: SocSci, Div, Wrt.—Shibamoto Smith

117. Language and Society (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, or Linguistics 1 and course 2. Consideration of language in its social context. Methods of data collection and analysis; identification of socially significant linguistic variables. Contributions of the study of contextualized speech to linguistic theory. GE credit: SocSci, Div, Wrt.—Shibamoto Smith

120. Language and Culture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4; or course 2 and Linguistics 1. Culture, cognition, meaning, and interpretation; language and the classification of experience; communication and learning in crosscultural perspective. GE credit: SocSci, Div, Wrt.—Yengoyan

122A. Economic Anthropology (4)
Lecture—3 hours; discussion—1 hour. Varieties of production, exchange, and consumption behavior in precapitalist economies, their interaction with culture and social-political organization, and the theories that account for these phenomena. The effects of capitalism on precapitalist sectors. Not open for credit to students who have completed course 122. (Former course 122.) GE credit: SocSci, Div, Wrt.—McElreath

122B. Anthropology and Political Economy (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of anthropological approaches to the study of political organizations; inter-relationships among political institutions, economic infrastructures and cultural complexity. Not open for credit to students who have completed course 123A. (Former course 123A.) GE credit: SocSci, Div, Wrt.

123AN. Resistance, Rebellion, and Popular Movements (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or the equivalent. Analysis of popular protest in Third World and indigenous societies ranging from covert resistance to national revolts. Comparative case studies and theories of peasant rebellions, millenarian movements, social bandits, Indian "wars", ethnic and regional conflicts, gender and class conflicts. Not open for credit to students who have completed course 123B. (Former course 123B.)—Srinivas

124. Religion in Society and Culture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Discussion of anthropological theories of religion with emphasis on non-literate societies. Survey of shamanism, magic and witchcraft, ritual and symbols, and religious movements. Extensive discussion of ethnographic examples and analysis of social functions of religious institutions. GE credit: SocSci, Div, Wrt.—Srinivas

125A. Structuralism and Symbolism (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Survey of anthropological approaches to understanding the logic of structuralism and symbolism in cultural analysis. Focus on how structural and symbolic interpretations relate to cultural and linguistic universals and to the philosophical basis of relativism in the social sciences. (Former course 125.) GE credit: SocSci, Div.—Yengoyan

125B. Postmodernism(s) and Culture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. The U.S.-European postmodern condition. "Modernity" as an incomplete project for subordinated groups. The economic, social, technological and political conditions leading to postmodern aesthetics, in comparison with postcolonialism, feminism and minority discourse. GE credit: SocSci, Div, Wrt.—Yengoyan

126A. Anthropology of Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Theories of development and current critiques. Colonial legacies and post-colonial realities. Roles of the state and NGOs, population migrations, changing gender identities, cash-earning strategies, and sustainability issues. Stresses importance of cultural understandings in development initiatives. Case studies emphasizing non-industrial societies. Not open for credit to students who have completed course 126. (Former course 126.) GE credit: SocSci, Div, Wrt.—J. Smith

126B. Women and Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Current Third World and Western development issues concerning women in agriculture, industry, international division of labor, political movements, revolutions, politics of health, education, family and reproduction. Impact of colonialism, capitalism, the world system, and international feminism on women and development. Not open for credit to students who have completed course 131. (Former course 131.) GE credit: SocSci, Div, Wrt.

127. Urban Anthropology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of approaches to urban living: political structures, organization of labor, class relations, world views. The evolution of urban life and its contemporary dilemmas. Cross-cultural comparisons discussed through case studies. GE credit: SocSci, Div, Wrt.—Zhang

128A. Kinship and Social Organization (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative examination of personal kinship, descent, marriage, household and family organizations; the theories that account for variation, and recent advances in the treatment of these data. Not open for credit to students who have completed course 128. (Former course 128.) GE credit: SocSci, Div, Wrt.—Winterhalder

128B. Self, Identity, and Family (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Exploration of self, identity, and family systems cross-culturally. Impact of class, gender, race, ethnicity, ruralization, urbanization, and globalization on notions of selfhood in different social/cultural systems. Not open for credit to students who have completed course 129. (Former course 129.) GE credit: SocSci, Div, Wrt.

129. Health and Medicine in a Global Context (4)
Lecture/discussion—4 hours; term paper. Prerequisite: course 2 or Science and Technology Studies 1. Recent works in medical anthropology and the science studies of medicine dealing with global health issues such as AIDS, pandemics, clinical trials, cultural differences in illnesses, diabetes, organ trafficking, medical technology and delivery, illness narratives, and others. (Same course as Science and Technology Studies 129.) GE credit: Div, SocSci, Wrt.—Dumit

130A. Cultural Dimensions of Globalization (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. The cultural dimensions of recent economic and political developments frequently termed "globalization." GE Credit: SocSci, Wrt.—J. Smith

130BN. Migration and the Politics of Place and Identity (4)
Lecture/discussion—4 hours. Prerequisite: course 2 or consent of instructor. Internal and international migration from an anthropological perspective, including causes, processes, and political, economic, and cultural effects of spatial mobility and displacement. Emphasizes the interplay of identity, place, and power in diverse cultural and historical contexts. Not open for credit to students who have completed course 123D. (Former course 123D.) GE credit: SocSci, Wrt.

131. Ecology and Politics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Analysis of the complex interactions between ecological dynamics and political processes employing the emerging approach of political ecology. Case studies of environmental degradation (e.g., desertification, logging, mineral extraction, petroleum, water) from various cultural and geographic regions. GE credit: SocSci, Div.—Sawyer

134. Buddhism in Global Culture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one lower division course in Anthropology, Sociology, History, or Religious Studies. Buddhist meditation and ritual as a cultural system that adapts to global and local forces of change. Anthropological theory and method in understanding global culture transmission, including Buddhist reform movements in Asia and Buddhist practice in the West. Limited enrollment. GE credit: SocSci, Div, Wrt.—Klima

136. Ethnographic Film (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Overview of the use of film in anthropology and its advantages and limitations in comparison to written ethnographic descriptions. Essential features of ethnographic films. Film production in anthropological research and problems encountered in producing films in the field. GE credit: SocSci, Wrt.—Klima

137. Meditation and Culture (4)
Lecture/discussion—3 hours; discussion—1 hour. Prerequisite: one lower division course in Anthropology, Sociology, History, Philosophy, Psychology, or Religious Studies. Study and practice of the relation between meditation and cultural conditioning; comparison of Buddhist practice with other cultural constructions of mind, body, brain, thought, emotion, and self. Limited enrollment. Not offered every year.—Klima

138. Ethnographic Research Methods in Anthropology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 2 and 137. Basic concepts in and approaches to ethnographic field research. Problem formulation, research design, qualitative and quantitative data collection procedures, and techniques for organizing, retrieving, and analyzing information. Ethnographic description and constructed inference. Students will organize and conduct individual research projects. GE credit: SocSci.—de la Cadena

139AN. Race, Class, Gender Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative analysis of class/race/gender inequality, concentrating on the ways in which beliefs about descent, "blood," and biological difference interact with property and marital systems to affect the distribution of power in society. Not open for credit to students who have completed course 139. (Former course 139.) GE credit: SocSci, Div, Wrt.—de la Cadena

139BN. Gender and Sexuality (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Gender and sexuality in foraging bands, horticultural and pastoral tribes, agricultural and industrial states. Debates on cultural evolution and distribution of gender hierarchies. Impact of politics, economics, religion, social practices, women's movements on gender and sexuality. Culture, nature, and sexuality. Not open for credit to students who have completed course 130. (Former course 130.) GE credit: SocSci, Div, Wrt.—Choy

140A. Cultures and Societies of West and Central Africa (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic survey of West Africa and Congo Basin with analyses of representative societies which illustrate problems of general theoretical concern. Major consideration will be the continuities and discontinuities between periods prior to European contact and the present. GE credit: SocSci, Div, Wrt.

140B. Cultures and Societies of East and South Africa (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic survey of Eastern and Southern Africa with analyses of selected societies which illustrate problems of interest to anthropologists. Major consideration will be given to continuities and discontinuities between periods prior to European contact and the present. GE credit: SocSci, Div, Wrt.—J. Smith

141B. Ethnography of California and the Great Basin (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Description and analysis of the native peoples of California and the Great Basin, and their lifeways at the time of European contact. (Former course 141C.) GE credit: SocSci, Div, Wrt.—Bettinger

141C. People of the Arctic: Contemporary and Historic Cultures of the Circumpolar Region (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 3. Social, economic, political, and religious lives of Russian, American, Canadian, and Greenlandic Arctic people (Yup'ik, Iñupiat, Inuit). Topics include Arctic ecosystems, archaeological

record of human occupation, ethnohistorical and ethnographic accounts, arctic people in popular culture, and contemporary issues. Offered in alternate years.—I. Darwent

142. Peoples of the Middle East (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Peoples of the Middle East (including North Africa). Discussions of class relations, kinship organization, sex/gender systems, religious beliefs and behavior, ethnic relations, political systems. Impact of world systems, political and religious movements and social change. (Former course 136.) GE credit: SocSci, Div, Wrt.—Joseph

143A. Ethnology of Southeast Asia (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Patterns of culture and social organization from prehistory to the present, in the context of historical, ecological, economic, and political settings. Emphasis on the relation of ethnic minorities to national states. GE credit: SocSci, Div, Wrt.—Yengoyan

144. Contemporary Societies and Cultures of Latin America (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Introduction to contemporary social structure of Latin America. Origins, maintenance and changes in inequality: economic responses to poverty, sociocultural responses to discrimination, and political responses to powerlessness. GE credit: SocSci, Div, Wrt.—de la Cadena

145. Performance, Embodiment, and Space in South Asia (4)
Lecture/discussion—4 hours. Prerequisite: course 2 or consent of instructor. South Asian cultures and societies with a focus on performance, embodiment, and space from several disciplinary fields. Topics may include colonialism, nationalism, religious traditions, media, popular culture, cities, social movements, modernity, body-cultures, identity, gender, and diasporas. GE credit: ArtHum or SocSci, Div, Wrt.—Srinivas

148A. Culture and Political Economy in Contemporary China (4)
Lecture/discussion—4 hours. Prerequisite: course 2 or consent of instructor. Examining contemporary Chinese culture and political economy through reading ethnographic studies on recent transformations in rural and urban Chinese society. Special attention is given to state power, popular culture, spatial mobility, city space, and gender. GE Credit: Div, SocSci, Wrt.—Zhang

149A. Traditional Japanese Society (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Patterns of culture and social organization from prehistoric to early twentieth-century Japan. Origins, prehistory, and traditional religious and political systems, marriage and kinship, language and culture. Changes and continuities in traditional and contemporary Japanese culture are addressed. GE credit: SocSci, Div, Wrt.

149B. Contemporary Japanese Society (4)
Lecture—3 hours; discussion—1 hour. Introduction to contemporary Japanese social structure, social organization, and patterns of culture. Analysis of rural-urban cultural continuities and contrasts, class relations, political and economic systems, kinship, sex/gender systems, contemporary religious beliefs and behavior, conflict, consensus, and cultural stereotypes. GE credit: SocSci, Div, Wrt.—Shibamoto Smith

151. Primate Evolution (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Biological Sciences 1B. Origin and relationships of the prosimians, monkeys, and apes. GE credit: SciEng, Wrt.—Isbell

152. Human Evolution (5)
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1 or Biological Sciences 1B. Nature and results of the evolutionary processes involved in the formation and differentiation of humankind. GE credit: SciEng, Wrt.—Weaver

153. Human Biological Variation (5)
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1 or Biological Sciences 1B. Origin, adaptive significance and methods of analysis of genetic differences among human populations. Special attention given to racial differences such as those in blood groups, plasma proteins, red cell enzymes, physiology, morphology, pigmentation and dermatoglyphics. GE credit: SciEng, Wrt.—D.G. Smith

154A. The Evolution of Primate Behavior (5)
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1. Examines ecological diversity and evolution of social systems of prosimians, monkeys, and apes, placing the social behavior of the primates in the context of appropriate ecological and evolutionary theory. GE credit: SciEng, Wrt.—Isbell

154BN. Primate Evolutionary Ecology (5)
Lecture—3 hours; lecture/discussion—1 hour; term paper. Prerequisite: course 1 or introductory course in evolutionary biology or ecology. Examination of the ecology of primates within an evolutionary framework. Theoretical concepts in individual, population, and community ecology, illustrated with primate (and other vertebrate) examples. Includes topics in primate and rainforest conservation. GE credit: Wrt.—Marshall

154C. Behavior and Ecology of Primates (2)
Lecture/discussion—2 hours. Prerequisite: course 54, 154A, or 154BN; Statistics 13 or its equivalent. Scientific methods of studying, describing and analyzing the behavior and ecology of primates. Offered in alternate years. (P/NP grading only.)—Isbell

154CL. Laboratory in Primate Behavior (4)
Laboratory—6 hours; term paper. Prerequisite: course 54, 154A, or 154BN; Statistics 13 or its equivalent. Design and conduct of scientific "field studies" of the behavior of group-living primates at the California National Primate Research Center Offered in alternate years.—Isbell

156A. Human Osteology (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or equivalent. Human skeleton from archaeological, forensic, and paleontological perspectives, including anatomical nomenclature, variation with sex and age, function, evolution, growth, and development of bones and teeth. Hands-on study and identification of human skeletal remains. Cannot be taken by students who have previously completed course 156.—Weaver

156B. Advanced Human Osteology (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 156A or equivalent. Human skeletons from archaeological, forensic, and paleontological contexts. Bone and tooth structure, growth, and development; measurement, statistics, and biomechanics; assessment of age, sex, weight, height, and ancestry; and indicators of illness, injuries, diet, and activities. Offered in alternate years.—Weaver

157. Anthropological Genetics (3)
Lecture—3 hours. Prerequisite: course 1 or Biological Sciences 1A, and Genetics 100, 103, 105, or 106. Processes of micro-evolution responsible for biological differences among human populations. Special attention will be given to the adaptive significance of genetic variation in blood group antigens, serum proteins and red cell enzymes. GE credit: SciEng.

157L. Laboratory in Anthropological Genetics (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1 or Biological Sciences 1A, and either Genetics 100 or enrollment in course 157 (concurrently or following). Methods for identifying genetic variation in human blood group antigens, serum proteins and red cell enzymes (hemaglutination), general electrophoresis on starch, cellulose acetate and polyacrylamide, immunodiffusion and immunoelectrophoresis on agarase. (P/NP grading only.) GE credit with concurrent enrollment in course 157: Wrt.

158. The Evolution of Females and Males: Biological Perspective (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Current theoretical frameworks for explaining the evolution of sex differences and for understanding the interrelationship between biological processes and cultural construction of gender roles. GE credit: SciEng, Div, Wrt.—Marshall

159. Molecular Anthropology of Native America (4)
Seminar—3 hours; term paper. Prerequisite: course 1 or Biological Sciences 1B or consent of instructor. Use of DNA and other genetic polymorphisms to test hypotheses regarding genetic relationships among different Native American tribal groups and about prehistoric population replacements and migrations to and within the Americas. Integration with craniometric, archaeological, paleoenvironmental, linguistic and ethnohistorical evidence.—D. Smith

160. Neandertals and Modern Human Origins (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or equivalent. Origins, evolution, and disappearance of Neandertals. Emergence of humans like us in both anatomy and behavior. Interpretation of the fossil and archaeological records of Europe and Africa. Genetics of living and fossil humans. Offered in alternate years.—Weaver

170. Archeological Theory and Method (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 3. Introduction to history and development of archeological theory and method, with particular emphasis on the basic dependence of the latter on the former. Stress is on historical development of archaeology in the New World. GE credit: SocSci, Div, Wrt.—Bettinger

172. New World Prehistory: The First Arrivals (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Survey of data relating to the peopling of the New World. Cultural adaptation and development of early inhabitants of North and South America. Offered in alternate years. GE credit: SocSci, Div, Wrt.

173. New World Prehistory: Archaic Adaptations (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor; course 170 recommended. Introduction to and survey of prehistoric hunting and gathering adaptations across North America with particular emphasis on the East, Southeast, Midwest, Plains, Southwest, and Northwest. Offered in alternate years. GE credit: SocSci, Div, Wrt.

174. European Prehistory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Survey of the prehistory of Europe from its earliest human inhabitants, to the Neandertals and first modern humans, and through early agricultural and complex societies. Analysis and interpretation of the European archaeological record for understanding human dispersals into Europe. Offered in alternate years.—Steele

175. Andean Prehistory: Archaeology of the Incas and their Ancestors (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Prehistory of the Andean region, especially Peru, from the earliest hunting and gathering societies through the Inca. Focus on the use of archaeological data to reconstruct ancient human adaptations to the varied Andean environments. Offered in alternate years.—Eerkens

176. Prehistory of California and the Great Basin (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Description and analysis of the prehistoric peoples of California and the Great Basin from earliest times to European contact. Offered in alternate years. GE credit: SocSci, Div, Wrt.—Eerkens

177. African Prehistory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Survey of prehistory of Africa from early human ancestors, through modern human origins, and into early agricultural and complex societies and the Bantu expansion. Analysis and interpretation of the African archaeological record, incorporating human paleontology and genetics. Offered in alternate years.—Steele

178. Hunter-Gatherers (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Study and interpretation of the ancient and modern lifeway in which peoples support themselves with primitive technologies and without benefit of domesticated plants and animals. Offered in alternate years. GE credit: SocSci, Div, Wrt.—Bettinger

180. Zooarcheology (4)
Lecture—2 hours; discussion/laboratory—3 hours. Prerequisite: course 1 and 3 or consent of instructor. Theories and methods for studying animal skeletal remains from archaeological sites. Identification and quantification of zooarchaeological material, cultural and natural processes affecting animal bones pre and postburial, and use of faunal remains for determining past human diets and past environments. Offered in alternate years.—Darwent, Steele

181. Field Course in Archeological Method (9)
Lecture—6 hours; daily field investigation. Prerequisite: course 3. On-site course in archeological methods and techniques held at a field location in the western United States, generally California or Nevada. Introduces basic methods of archeological survey, mapping, and excavation. GE credit: SciEng.—IV.

182. Archaeometry (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 3; Statistics 13 or the equivalent recommended. Scientific techniques used to study the chemical and physical properties of archaeological materials. Types of anthropological questions that can be addressed with different methods. Preparation and analysis of archaeological materials. Offered in alternate years.—Eerkens

183. Laboratory in Archeological Analysis (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 181 or consent of instructor. Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. May be repeated for credit with consent of instructor. Limited enrollment. GE credit: SciEng, Wrt.—Steele

184. Prehistoric Technology: The Material Aspects of Prehistoric Adaptation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 3. Examination of the role of lithic, ceramic, textile and wooden implements as elements in prehistoric survival and development. Emphasis is descriptive, but the significance of material resources as factors in prehistoric adaptation, settlement patterns, and culture change are discussed. Offered in alternate years. GE credit: SocSci.—Eerkens

Special Study Courses

191. Topics in Anthropology (4)
Lecture/discussion—3 hours; term paper. Prerequisite: junior or senior standing in anthropology. Intensive treatment of a special anthropological topic or problem. May be repeated one time for credit when topic differs.—I. Darwent

192. Internship in Anthropology (1-12)
Internship—3-36 hours. Prerequisite: Upper division standing; consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Anthropology under the supervision of a member of the faculty. Limited to Anthropology majors. May be repeated for a total of 12 units including 192 courses taken in other departments. (P/NP grading only.)

194H. Special Study for Honors Students (1-5)
Prerequisite: open only to majors of senior standing who qualify for honors program. Independent study of an anthropological problem involving the writing of an honors thesis. May be repeated for a total of 12 units. (P/NP grading only.)

197T. Tutoring in Anthropology (1-5)
Tutorial—1-5 hours. Prerequisite: upper division standing with major in Anthropology and consent of Department Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

200. History of Anthropology (4)
Lecture/discussion—2 hours; term paper. Historical development of socio-cultural theory within anthropology, from mid-19th to mid-20th Centuries. Focus on original theory texts in context of historical developments in the field as a whole.—McElreath, Winterhalder

201. Critical Readings in Ethnography (4)
Seminar—3 hours; term paper. Critical readings of selected ethnographies that examine a wide range of important topics and analytical issues in social and cultural anthropology. Emphasis on how and why ethnographic writing has changed over time and its relationship with contemporary theoretical explorations.—I. (I.) Zhang

202. History and Theory of Biological Anthropology (4)
Seminar—3 hours; term paper. History of thought in biological anthropology and analysis of major theoretical problems in the field. Suggested for all first-year graduate students lacking intensive preparation in biological anthropology.

203. History and Theory of Archaeology (4)
Seminar—3 hours; term paper. History of archaeology and archaeological theory and analysis of archaeological research methodology. Generally restricted to graduate students; outstanding undergraduates with extensive training in archaeology with consent of instructor.—I. (I.) Bettinger

204. Contemporary Issues in Anthropological Theory (4)
Seminar—3 hours; term paper. Prerequisite: course 2, 137 or consent of instructor. Advanced consideration of fundamental issues in anthropological theory. Emphasis on critical examination of major contemporary debates between proponents of competing theories.—Srinivas

205. History and Theory in Anthropological Linguistics (4)
Seminar—3 hours; term paper. History of thought in anthropological linguistics. Consideration of the historical development of fundamental ideas in anthropological linguistics, of major theoretical issues, and of research methodology.—Shibamoto Smith

206. Research Design and Method in Social Anthropology (5)
Seminar—4 hours; individual student-instructor session (in-depth work on proposal writing). Prerequisite: consent of instructor. Formulation of research problems and preparation of research proposals; relationships between theory and method, funding, pre-fieldwork preparations, entering the community, field research techniques, and problems of ethics; intensive work on proposal writing. May be repeated one time for credit. Limited enrollment.—J. Smith

207. Ethnographic Writing (4)
Seminar—3 hours; term paper. Prerequisite: courses 137, 201, or the equivalent. Relationship between conducting participant observation of others and writing it up, emphasizing the processual rift between the reality of fieldwork and its written representation. Study of various literary genres and textual strategies used in cultural anthropology. May be repeated for credit.

210. Aspects of Culture Structure (4)
Seminar—3 hours; term paper. Analysis of various phases of culture, such as religion, economics, law, and folklore. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

211. Advanced Topics in Cultural Ecology (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Environmental Science and Policy/Anthropology 133, graduate standing in Anthropology or Ecology. Topics of current analytical and methodological importance in cultural ecology. Examination of general issues in cultural ecology through study of human response to and influence on climate. (Same course as Ecology 211.)

212. Political Ecology (4)
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Interdisciplinary seminar evaluating contributions from ecological anthropology, political economy, cultural constructivism, postmodernism, and feminism towards development of theories of political ecology. Historical relationships between local/global power structures, environmental degradation, and resistance movements. Case studies of desertification, deforestation, mining, conservation, development.

216. Problems in Archeological Method (4)
Seminar—3 hours; term paper. Techniques for analyzing archeological data; application to various prehistoric cultures. May be repeated for credit with consent of instructor.—Darwent, Steele

217. Quantitative Modeling in Archaeology (4)
Lecture/discussion—3 hours; term paper. Examination of the nature of archaeological data with a focus on the quantitative and statistical techniques available to model, analyze, display, and make sense of such data. Offered in alternate years.—III. Eerkens

218. Topics in New World Prehistory (4)
Seminar—3 hours; term paper. Advanced study on current problems in New World Prehistory and archaeology. May be repeated for credit only if material is unique for that student and with consent of instructor. May be repeated for credit. Not offered every year.—(II.) Darwent, Eerkens

219. Topics in Old World Prehistory (4)
Seminar—3 hours; term paper. Advanced study on current problems in Old World prehistory and archaeology. May be repeated for credit only if material is unique for that student and with consent of instructor. May be repeated for credit. Not offered every year.

220. Field Course in Linguistics (4)
Seminar—2 hours; laboratory—2 hours. Prerequisite: courses 110, 111. Techniques of eliciting, recording, and analyzing; work with a native speaker.

221. Rural Transformation in Postcolonial Societies (4)
Seminar—3 hours; term paper. Prerequisite: courses 223, 265, or consent of instructor. Problems of rural transformation arising out of political and economic interaction between national elites and rural regional and local populations under varying conditions of induced change in postcolonial societies. Attention will be given to the implications of this interaction for rapid economic growth. May be repeated for credit.

222. Cities and Citizenship (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. The nature of modern cities, urban socio-economic life, and urban culture and politics from an anthropological perspective.

223. Economic Anthropology (4)
Seminar—3 hours; term paper. Prerequisite: course 122 or consent of instructor. Selected current methodological and theoretical problems in the analysis of nonindustrial economic systems.

224. Problems in Comparative Religion (4)
Seminar—3 hours; term paper. Advanced study of current problems in the anthropological study of religion.

225. State and Nation in the Modern World (4)
Seminar—3 hours; term paper. A presentation of current anthropological theories of the origins and nature of the modern nation-state in both the First and Third Worlds, with special reference to state ideology (nationalism) and forms of control.

226. Consciousness and Resistance (4)
Seminar—3 hours; term paper. Prerequisite: completion of first-year graduate work or consent of instructor. Consideration of approaches to the study of social inequality, and responses of subordinated groups. Emphasis on situating approaches to contemporary social theory, concrete research problems, and political strategies. Topics: formation of consciousness and identity; collective action, accommodation to frontal resistance.

228. Culture and Power (4)
Seminar—3 hours; extensive writing. Prerequisite: graduate standing or consent of instructor. Exploration of one of the core paradigms within contemporary anthropological inquiry, "culture and power." Focus on how distinct theoretical perspectives—Marxism, post-Marxism, structuralism, post-structuralism, and feminism—have examined the mutually constitutive nature of culture and power.—II. (II.) Sawyer

229. Gender, Identity, and Self (4)
Seminar—3 hours; term paper. Intersections of gender, identity, and selfhood cross-culturally and historically. How the self is feminized and masculinized, and interfaces with sexual, race, class, work, national, minority, and majority identities under different historical, cultural, and social structural conditions. May be repeated for credit when topic differs.—II. (II.) Joseph

230. Family Systems and Reproduction: Theory and Comparisons (4)
Lecture—1.5 hours; seminar—1.5 hours; term paper. Prerequisite: graduate standing in one of the social sciences including History. Comparative examination of family systems in historical context and of reproductive behaviors and strategizing. A major theme is how family-system norms specify the relative desirability of differently configured offspring sets. Cases are drawn from Western Europe and South and East Asia.

232. Political Movements (4)
Seminar—3 hours; term paper. Prerequisite: completion of first-year graduate work recommended. An interdisciplinary approach to political movements of protest, reform, and revolution emphasizing historical comparison and evaluation of major theoretical approaches including world systems, resource mobilization, state and culture, rational choice, moral economy, social class and gender.

239. Problems in African Society and Culture (4)
Seminar—3 hours; term paper. Diachronic analyses of traditional institutions in sub-Saharan Africa.

241. Topics in North American Ethnology (4)
Seminar—3 hours; term paper. Advanced study on current problems in North American ethnography and culture history. May be repeated for credit with consent of instructor.

245. Ethnology of Northern and Central Asia (4)
Seminar—3 hours; term paper. Prerequisite: a reading knowledge of German, Russian, Chinese, or Japanese. Lectures on the culture aboriginally found north of the Caucasus-Korea line. Supervised study of the primary and secondary sources. Work with informants when available.

246. Ethnology of Europe (4)
Seminar—3 hours; term paper. Prerequisite: reading knowledge of a European language other than English. Supervised study of the primary and secondary sources dealing with the ethnography and ethnology of the peoples of Europe. Emphasis upon folk, peasant, and minority groups.

248. Topics in Chinese Culture and Society (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing in the social sciences, history, or the humanities. Selected topics in the anthropology of Chinese society. Focus on one or more of the following topics: state-society dynamics, family and gender, city formation and urban life, social movement, labor politics, and religion and ideology in Chinese society. May be repeated for credit when topic differs.

250. Behavioral Ecology of Primates (4)
Seminar—3 hours; term paper. Prerequisite: course 154A (may be taken concurrently) or the equivalent, graduate standing. Concepts, issues, and hypotheses in primate behavioral ecology, with emphasis on the social and ecological determinants and consequences of variation in social organization for individuals.

252. Human Evolution Seminar (4)
Seminar—3 hours; term paper. Prerequisite: course 152 or the equivalent; consent of instructor. Study of selected topics in human evolutionary studies. Each year course will focus on one or more of the following: molecular evolution, primate evolutionary biology, Tertiary hominoids, Australopithecus, Homo erectus, archaic Homo sapiens, brain evolution. May be repeated for credit.—Weaver

253. Seminar in Human Biology (4)
Seminar—3 hours; term paper. Prerequisite: course 153, 157, or consent of instructor. Study of selected topics in human biology. May be repeated for credit when topics vary.—D. Smith

254. Current Issues in Primate Sociobiology (4)
Seminar—3 hours; term paper. Prerequisite: course 154B or the equivalent. Analysis of primate behavior, with particular emphasis on preparation for field studies. May be repeated for credit when topic differs.—Isbell

256. Primate Conservation Biology (4)
Seminar—3 hours; term paper. Prerequisite: course 154, graduate standing or upper division undergraduate with consent of instructor. Application of understanding of primate biology to conservation of primates and their habitat. Topics include evolutionary anthropology, behavioral ecology, biogeography, macroecology, population biology, and socioecology of primates. May be repeated one time for credit if term paper differs. (S/U grading only.)—Marshall

261. Modeling the Evolution of Social Behavior (4)
Lecture—3 hours; extensive problem solving. Prerequisite: Mathematics 16C or the equivalent or consent of instructor. Tools and topics in modeling the evolution of social behavior in humans and other animals. Game theory, basic population genetics, animal conflict, altruism, reciprocity, signaling, and group selection.—McElreath

262. Evolution and Human Behavior (4)
Discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Exploration of the links between behavioral ecological theory and human cultural variation, focusing on reproduction, marriage, parental investment and family structure; implications of evolutionary theory for social organization in human communities, historical and contemporary.—Borgerhoff, Mulder

263. Human Applications of Foraging Theory (4)
Discussion—3 hours; laboratory—3 hours. Foraging theory models and their use in ethnographic and archaeological analyses of human behavior, with a focus on hunter-gathers and resource selection, patch use, population and habitat, central places, sharing, stochastic processes, population dynamics, and conservation behavior. Not open for credit to students who have completed course 258.—Winterhalder

265. Language, Performance, and Power (4)
Seminar—3 hours; term paper. Graduate standing or consent of instructor. Exploration of the intersection between linguistic and social theories in the language-state relation and the performance of identity. Ideological sources of language differentiation; nation-building and linguistic difference. Political economic, sociolinguistic, and ethnographic approaches to understanding linguistic inequality. (Same course as Linguistics 265.)—Shibamoto Smith

270. Anthropology Colloquium Seminar (1)
Seminar—1 hour. Reports and discussions of recent advances in the four subfields of anthropology. To be presented by guest speakers. May be repeated two times for credit. (S/U grading only.)—I, II, III. (I, II, III.)

280. Current Anthropology Journal Editorial Workshop (4)
Workshop—1 hour; independent study—3 hours. Students must enroll for all three quarters. Reading and offering workshop critiques of manuscripts submitted for publication, and reading and discussion of other relevant work in anthropology and human ecology. Track and edit published comments and authors' replies that accompany major features. Participation in the development of new sections for the electronic edition of the journal, including a "news and views" section and a debate section. (Same course as Ecology 280.) May be repeated for 12 units of credit with consent of instructor. (S/U grading only.)

291. Advanced Topics in Human Behavioral Ecology (4)
Discussion—3 hours; term paper. Prerequisite: course 261, 262, or 263, or comparable experience in anthropology or related disciplines and consent of instructor. Topically focused, critical discussion of current and emerging research in the field of human behavioral ecology, giving special attention to theory, concepts, models, and methods for the evolutionary analysis of ethnographic and archaeological evidence. May be repeated one time for credit if topic differs.

292. Seminar in Linguistic Anthropology (4)
Seminar—3 hours; term paper. Selected topics in linguistic anthropology. May be repeated for credit when topic differs.

298. Group Study (1-4)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

299D. Dissertation Research (1-12)
(S/U grading only.)

Professional Courses

390. Teaching Anthropology (4)
Seminar—3 hours; practice—1 hour. Prerequisite: graduate standing in Anthropology or closely related discipline. Intellectual and practical elements of college teaching in the field of Anthropology, from curriculum design and the syllabus through grading and course evaluations, including classroom and information technology methods, and problems and rewards of teaching in higher education. Offered in alternate years.—(II.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III.

Applied Behavioral Sciences

See Community and Regional Development, on page 198.

Applied Biological Systems Technology

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Engineering: Biological and Agricultural, on page 238.

Courses in Applied Biological Systems Technology (ABT)

Lower Division Courses

15. Wood Properties and Coopering (2)
Lecture/discussion—1 hour; laboratory—2 hours. Identify wood types, properties and milling processes: sawing, planing, drilling, clamping, marking and measurement. Examine wood strength, visual, odor and taste properties. Participate in individual barrel-raising process. Visit coopering facilities to observe barrel production and winery and distillery products. (P/NP grading only.)—II. (II.) Grismer, Shafii

16. Metal Properties and Fabrication (2)
Lecture—1 hour; laboratory—3 hours. Study of metal properties and of techniques for fabricating in metal. Physical principles, design considerations, effects of techniques on quality and appearance, and evaluation procedures. Experience in working with metal. (P/NP grading only.)—I. (I.) Shafii

17. Plastic Properties and Fabrication (2)
Lecture—1 hour; laboratory—3 hours. Study of the properties of plastic materials and the fundamentals of fabrication techniques. Experience in working with common plastics, with applications to biological systems. (P/NP grading only.)—III. (III.)

49. Field Equipment Operation (2)
Lecture—1 hour; laboratory—3 hours. Operation, adjustment, and troubleshooting of farm tractors and field equipment. Principles of operation, equipment terminology and uses of tilling, cultivating, thinning, and planting equipment. Typical sequences in cropping practices. (P/NP grading only.)—III. (III.) Shafii

52. Field Equipment Welding (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 16 or consent of instructor. Intermediate welding to include hardfacing and inert gas welding. Class projects on repair and fabrication by welding. Troubleshooting and major repair of field equipment. (P/NP grading only.)—II. (II.) Shafii

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5)
(P/NP grading only.)

Upper Division Courses

101. Engine Technology (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing or consent of instructor. Principles of 2-stroke cycle, 4-stroke cycle gasoline and 4-stroke cycle diesel engine construction and operation. Engine systems, performance, troubleshooting, and overhaul.—II. (II.) Rosa

110L. Experiments in Food Engineering (2)
Laboratory—6 hours. Prerequisite: Food Science and Technology 110B (may be taken concurrently). Use of temperature sensors; measurement of thermal conductivity and heat transfer in foods; refrigeration, freezing, concentration and dehydration of foods.—III. (III.) Singh

121. Animal Housing and Environment Management (2)
Lecture—2 hours. Prerequisite: Animal Science 1 or 2. Optimal structures and environments for animal growth and comfort; heat and moisture transfer principles; heating, cooling, ventilating principles and equipment; animal housing design; environmental regulations and waste management practices. Offered in alternate years.—(II.) Zhang

142. Equipment and Technology for Small Farms (2)
Lecture—1 hour; laboratory—3 hours. Types and characteristics of agricultural equipment and technologies appropriate for small commercial farming. Adjustment and calibration of equipment. Selection of and budgeting for equipment. (Same course as International Agricultural Development 142.)—III. (III.) Perkins

161. Water Quality Management for Aquaculture (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1B, Mathematics 16B, Chemistry 2B. Basic principles of water chemistry and water treatment processes as they relate to aquacultural systems. Offered in alternate years.—II. Piedrahita

163. Aquaculture Systems Engineering (3)
Lecture—3 hours. Prerequisite: course 161. Design of aquacultural systems: design methodology, principles of fluid mechanics, site selection and facility planning, management operations, computer modeling. Offered in alternate years.—III. Piedrahita

165. Irrigation Practices for an Urban Environment (2)
Lecture—2 hours. Prerequisite: Physics 1A or 5A. Basic design, installation, and operation principles of irrigation systems for turf and landscape: golf courses, parks, highways, public buildings, etc. Emphasis on hardware association with sprinkler and drip/trickle systems.—II. (II.) Delwiche, Grismer

175. Introduction to Global Positioning System (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Science and Society 18 or course 180. Principles of position measurement. Differential and RTK GPS. Sources of Error, Datum, projection and mapping. Application of GPS-surveying, navigation, recreation, guidance, and precision agriculture. Offered in alternate years.—I. Upadhyaya

180. Introduction to Geographic Information Systems (4)
Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: Agricultural Management and Rangeland Resources 21 or equivalent familiarity with computers, Agricultural Management and Rangeland Resources 120 or the equivalent, Mathematics 16A. Management and analysis of georeferenced data. Spatial database management and modeling. Applications to agriculture, biological resource management and social sciences. Cartographic modeling. Vector and raster-based geographic information systems. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 132. (Same course as Plant Sciences 180.)—I. (I.) Plant

181N. Concepts and Methods in Geographic Information Systems (4)
Lecture/laboratory—8 hours.Prerequisite: course 180 or Agricultural Management and Rangeland Resources 180 or Landscape Architecture 50 or consent of instructor. Data representation and analysis in geographic information systems (GIS). Creation of spatial data sets from analog and digital sources such as aerial photography and maps; data structures, data management, database design, georeferencing, georectification, surface models, analysis, and spatial data visualization. Offered in alternate years.—II. Plant

182. Environmental Analysis using GIS (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 180 or equivalent GIS experience and skills; general biology and/or ecology courses recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment, natural resource management. Spatial database structures, scripting, data models, and error analysis in GIS. Offered in alternate years.—III. Zhang

190C. Research Conference for Advanced Undergraduates (1)
Discussion—1 hour. Prerequisite: consent of instructor. Research conferences for specialized study in applied biological systems technology. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship in Applied Biological Systems Technology (1-5)
Internship—3-15 hours. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised internship in applied biological systems technology. May be repeated for credit. (P/NP grading only.)

197T. Tutoring in Applied Biological Systems Technology (1-5)
Tutorial. Tutoring individual students, leading small voluntary discussion groups, or assisting the instructor in laboratories affiliated with one of the department's regular courses. May be repeated for credit if topic differs. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

233. Pest Control Practices (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: graduate standing or consent of instructor. Practical and theoretical considerations of pest control systems and techniques. Design, selection, and use of mechanical systems for field, orchard, greenhouse, and vector control use. Biological, legal, and environmental considerations in pest control and pesticide application.—II. Giles

290C. Graduate Research Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in applied biological systems technology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Professional Course

317. Teaching Agricultural Mechanics (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: a course in physics; 6 units related to agricultural mechanics; enrolled in Agricultural Education Teacher Credential Program. Preparation of the teacher to plan, organize, and conduct an agricultural mechanics program in secondary schools. Development of and presentation of lesson plans and teaching aids. Review of subject matter in metal fabrication, power and machinery and agricultural structures areas.—I. (I.) Perkins

Applied Computing and Information Systems

(College of Agricultural and Environmental Sciences)

This minor is for students interested in applying modern computer technology to management problems in agriculture, resource management, and other areas. Course work provides knowledge of the use of information technology and the methodology of applied quantitative and systems analysis. The minor is offered by the Department of Plant Sciences.

Minor Program Requirements:

UNITS

Applied Computing and Information Systems 18

Two or three of the following courses: Plant Sciences 120, 121, Animal Science 128, Engineering: Computer Science 167. (The third course may be taken in substitution for a course from either of the elective groups.) Remainder of the units to be made up of courses in one or both of the following groups 6-12

Computer applications, computer assisted analysis in data manipulation:

Agricultural and Resource Economics 106, 155, Plant Sciences 180, Applied Biological Systems Technology 180, 181, 182, Community and Regional Development 160, Economics 102, Engineering: Computer Science 124, Hydrologic Science 182, International Agricultural Development 170, Statistics 141

Communication and business organization:

Agricultural and Resource Economics 112, Community and Regional Development 168, Communication 103, 130, 134, 135, 136, International Agricultural Development 111

Minor Adviser. T.F. Famula *(Animal Science)*

Advising Center is located in 1220A Plant and Environmental Sciences (530) 752-1715.

Applied Mathematics (A Graduate Group)

Group Office. 1130 Mathematical Sciences Bldg. (530) 752-8131)
studentservices@math.ucdavis.edu;
http://www.math.ucdavis.edu/grad/ggam

Faculty. The Group includes approximately 85 faculty members, of whom about one-third are in the Department of Mathematics. Membership comprises chemists, biologists, physicists, geologists, statisticians, computer scientists, and engineers. Research interests include biology, atmospheric sciences, mechanics, solid and fluid dynamics, optimization and control, theoretical chemistry, computer and engineering sciences, mathematical physics, signal and image processing, harmonic analysis, numerical analysis and nonlinear partial differential equations. A complete list of faculty and their research areas are available on our Web page.

Graduate Study. Students prepare for careers where mathematics is applied to problems in the physical and life sciences, engineering, and management. The degree requirements consist of rigorous training in applied mathematics, including course work and a research dissertation under the direction of a member of the Graduate Group in Applied Mathematics. The M.S. degree provides preparation for further study in applied mathematics or an application area, or for a career in industry or public service. The Ph.D. degree provides preparation for a career in research and/or teaching, or in industrial or national research laboratories. For further information, please contact *studentservices@math.ucdavis.edu* or (530) 752-8131.

New applicants are admitted to the fall quarter only.

Preparation. The program admits qualified students with a bachelor's degree in mathematics, physics, chemistry, engineering, economics, the life sciences and related fields. General and advanced mathematics GRE scores are required, and applicants should display evidence of strong quantitative skills. Undergraduate courses should include calculus (including vector calculus), linear algebra, and ordinary differential equations. Advanced calculus (introduction to real analysis) is strongly recommended. Additional background in probability, partial differential equations, and/or numerical analysis is a plus. The ability to program in a high-level computer programming language (e.g., C, Fortran, MATLAB, Python, R, etc.) is assumed.

Graduate Advisers. Contact the Student Services Office at (530) 752-8131; *studentservices@math.ucdavis.edu*.

Courses. For a list of the courses in applied mathematics and mathematics, see Mathematics, on page 374.

Applied Physics

See Physics, on page 451.

Aquaculture

See Animal Biology, on page 148; Animal Science, on page 150; Applied Biological Systems Technology, on page 161; and Wildlife, Fish, and Conservation Biology, on page 533.

Arabic

See Classics, on page 191.

Art History

(College of Letters and Science)

Department Office. 101 Art Building
(530) 752-0105; *http://arthistory.ucdavis.edu*

Faculty

Katharine Burnett, Ph.D., Associate Professor
Christina Cogdell, Ph.D., Associate Professor
Lynn Roller, Ph.D., Professor
Jeffrey Ruda, Ph.D., Professor
Simon Sadler, Ph.D., Professor
Blake Stimson, Ph.D., Professor
Diana Strazdes, Ph.D., Associate Professor
Hegnar Watenpaugh, Ph.D., Associate Professor

Emeriti Faculty

Mary H. Fong, Ph.D., Professor Emerita
Robert J. Grigg, Ph.D., Professor Emeritus
Seymour Howard, Ph.D., Professor Emeritus
Dianne Sachko Macleod, Ph.D., Professor Emerita

The Major Program

Art History studies the changing visual expression of values, beliefs and experiences across diverse cultures and over time. It provides training in historical, social and aesthetic understanding, critical thinking, scholarly research, and lucid, thoughtful analysis and writing. More than any other discipline art history sharpens its students' visual acuity and deepens their visual literacy. In so doing, it prepares them to face the increasingly complex visual world we find ourselves in today.

The Program. The major begins with a series of courses that surveys major landmarks in the history of visual culture, art and architecture in Asia, Europe, and the United States. More advanced lecture courses and proseminars focus on particularly important periods and issues. Students are encouraged to personalize their training with internships, independent study, and focused upper-division study. Top students considering graduate study are encouraged to engage in more advance study in the Honors program.

Career Options. A major in Art History develops critical thinking and the integration of research, interpretation and understanding. It provides an excellent liberal arts basis for professions as far ranging as advertising, law, medicine, politics and business. The major prepares students for advanced study in Art History, Architecture, Museum Studies and Cultural Studies. It also serves as the foundation for careers in teaching, arts, administration, museums, galleries, historic preservation, art libraries, publishing, journalism, advertising, art conservation, and art investment. As the world becomes increasingly flooded with images, the critical visual literacy gained through the study of art history becomes more important for a wide variety of careers.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter..... 20

Any four of the following courses: Art History 1A, 1B, 1C, 1D, 1E, 5, 10 and 25..... 16

Any lower division Art Studio or Design course except Art 10, 30, Design 40A, 40B..... 4

Depth Subject Matter 40

Four courses, one each in four of the following six areas. Two courses must be from areas a, b, and c, and two courses must be from areas d, e, f..... 16

(a) Art History 172A, 172B, 173, 175
(b) Art History 163A, 163B, 163D, 164
(c) Art History 155
(d) Art History 178A, 178B, 178C, 179B
(e) Art History 168, 182, 183A, 183B, 183C, 188A, 188B, 188D, 188E
(f) Art History 184, 185, 186, 189

Art History 190 or 190A-H 4

Five additional upper division Art History courses 20

Any combination of upper division courses to be chosen in consultation with the major adviser. Appropriate course substitutions may be made with the consent of the major adviser. Art History 401 and 402 may be counted among the elective units.

Total Units for the Major 60

Minor Program Requirements:

UNITS

Art History 20

Three courses chosen from three of the following six areas with at least one course in area a, b, or c, and one course in area d, e, or f..... 12

(a) Art History 172A, 172B, 173, 175
(b) Art History 163A, 163B, 163D, 164
(c) Art History 155
(d) Art History 178A, 178B, 178C, 179B
(e) Art History 168, 182, 183A, 183B, 183C, 188A, 188B, 188D, 188E
(f) Art History 184, 185, 186, 189

Two additional Art History courses; Art History 190A-H strongly recommended 8

One lower division course may be substituted for upper-division study in any of these areas. Other appropriate substitutions may be made for the listed course options above with the prior consent of the major adviser.

Honors Program. The Honors Program is encouraged for Art History majors who are considering attending graduate school. To be eligible for the program, a student must have a grade point average of 3.700 in the major or consent of the major adviser. In addition to meeting the standard major requirements, the honors student completes one undergraduate proseminar (course 100 or 190A-H), and writes an honors thesis (course 194H). Students participating in this Program are candidates for Departmental recommendation for graduation with High or High-

est Honors. See the Academic Information chapter, Letters and Science honors section, of this catalog and consult the department for more information.

Teaching Credential Subject Representative. Department Chairperson; see the Teacher Education program.

Graduate Study. The Program in Art History offers studies leading to the Master of Arts degree in History of Art as preparation for further graduate study or professional work. For more information, contact the Graduate Staff Adviser at (530) 752-8710, or see *http://arthistory.ucdavis.edu*.

Courses in Art History (AHI)

Lower Division Courses

1A. Ancient Mediterranean Art (4)
Lecture—3 hours; discussion—1 hour. Introduction to the art and architecture of the ancient Mediterranean world, including Mesopotamia, Egypt, Greece, and Rome. GE credit: ArtHum.—I. (I.) Roller

1B. Medieval and Renaissance Art (4)
Lecture—3 hours; discussion—1 hour. Christian, Barbarian, Moslem, and Classical traditions in European Art from the fourth through the sixteenth centuries. GE credit: ArtHum.—II. (II.) Ruda

1C. Baroque to Modern Art (4)
Lecture—3 hours; lecture/discussion—1 hour. Survey of developments in western art and visual culture from 1600–present. Major artists and movements, theories of visuality, focused study on changing interpretations of class, gender, sexuality, and ethnicity from the Baroque period through modernism, to the present. May be repeated for credit. GE credit: ArtHum, Div.—III. (III.) Strazdes

1D. Arts of Asia (4)
Lecture—3 hours; discussion—1 hour. Introduction to major forms and trends in the arts and material culture of Asia from the Neolithic to the contemporary emphasizing the visual manifestation of secular and religious ideas and ideals. Not open for credit to students who have completed course 1DV. GE credit: ArtHum, Div.—Burnett

1DV. Arts of Asia (Virtual) (4)
Web virtual lecture—3 hours; discussion—1 hour; lecture/discussion—1.5 hours. Introduction to major forms and trends in the arts and material culture of Asia from the Neolithic to the contemporary emphasizing the visual manifestation of secular and religious ideas and ideals. Not open for credit to students who have completed course 1D. GE credit: ArtHum, Div.—II. (II.) Burnett

1E. Islamic Art and Architecture (4)
Lecture—3 hours; discussion—1 hour. Introduction to the art and architecture of the Islamic world including the Middle East, Africa, Europe, and South Asia, from the 7th century CE to the 20th. GE Credit: ArtHum, Div.—(I.) Watenpaugh

5. Introduction to Visual Culture (4)
Lecture—2 hours; film viewing—2 hours; discussion—1 hour. Development of visual literacy for an increasingly visual world. Critical analyses focus on a wide variety of visual media—art, television, film, advertising, the Internet—intended for a diverse spectrum of audiences. GE credit: ArtHum, Div, Wrt.—Stimson

10. Twenty Monuments (4)
Lecture—3 hours; lecture/discussion—1 hour. Demonstration of the breadth and depth of art-historical interpretation through the consideration of the meaning and significance of world-historical monuments from pre-history to the present. GE credit: ArtHum.—II. (II.)

25. Introduction to Architectural History (4)
Lecture—3 hours; discussion—1 hour. Formal and social history of architecture, examining design principles, major traditions, and concepts of architectural history with a focus on issues in Western architecture. Emphasis on nineteenth and twentieth centuries. GE credit: ArtHum.—(III.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Proseminar: Research and Writing Methods in Art History (4)
Extensive writing or discussion—3 hours; term paper. Prerequisite: two upper-division Art History courses; intended primarily for junior and senior students in Art History. Methods of art historical research and analysis, and general issues in critical thought. Writing skills appropriate to art history nonfiction writing. Offered irregularly. GE credit: ArtHum, Wrt.—(III.) Ruda

110. Cultural History of Museums and Art Exhibitions (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1A or 1B or 1C or 1D. Evolution of museums in the western world from the "cabinet of curiosities" of sixteenth-century Europe to the modern "art center." The changing motives behind collecting, exhibiting, and interpretation of objects. Attention to museums' historical legacies and their continuing philosophical dilemmas. Offered in alternate years. GE credit: ArtHum, Wrt.—I. Strazdes

150. Arts of Subsaharan Africa (4)
Lecture—3 hours; term paper or gallery studies and review. Traditional arts and crafts of subsaharan Africa; particular attention to the relationships between sculpture and culture in West and Central Africa. GE credit: ArtHum, Div.

151. Arts of the Indians of the Americas (4)
Lecture—3 hours; term paper or gallery studies and review. Development of art in North America, emphasizing ancient Mexico. South American relationships and parallels. Recent and contemporary Indian arts and crafts from Alaska to Chile. GE credit: ArtHum, Div.

152. Arts of Oceania and Prehistoric Europe (4)
Lecture—3 hours; term paper. Traditional arts of aboriginal Australia, Melanesia, Polynesia, and Micronesia, as seen in their cultural contexts. Prehistoric art of Europe and the Near East. GE credit: ArtHum, Div.

153. Art, Storytelling and Cultural Identity in the Pacific (4)
Lecture/discussion—3 hours; term paper. Representation of the cultural identities of indigenous and migrant groups of the Pacific in visual arts and storytelling. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

155. The Islamic City (4)
Lecture—3 hour; term paper. Prerequisite: course 1E recommended. Introduction to the urban history of the Islamic world. Includes critical study of the historiography of the Islamic city, development of urban form, institutions and rituals, and analysis of selected themes. GE Credit: ArtHum, Div, Wrt.—(II.) Watenpaugh

156. Arts of the Islamic Book (4)
Lecture—3 hours; term paper. Prerequisite: course 1E recommended. Critical study of the arts of the luxury book in the pre-modern Islamic world. Representation in Islam, the relationship of word and image, the discipline of calligraphy, aesthetics and representation in Persianate painting. GE Credit: ArtHum, Div, Wrt.—I, II, III. (I, II, III.) Watenpaugh

163A. Chinese Art (4)
Lecture—3 hours; term paper or gallery studies and review. A survey from the beginning to the twelfth century focusing on the major art forms that are traditionally known as well as newly discovered through archaeology in China. GE credit: ArtHum, Div, Wrt.—(II.) Burnett

163B. Chinese Painting (4)
Lecture—3 hours; term paper or gallery studies and review. The unique form of ink painting, with or without colors, depicting human and animal figures, flowers-and-birds, and landscape—the favorite and enduring theme of the Chinese scholar-painter. GE credit: ArtHum, Div, Wrt.—Burnett

163C. Painting in the People's Republic of China (4)
Lecture—3 hours; term paper. Prerequisite: course 1D or upper division standing. Analysis of the interaction between art and politics in the emergence of China into the modern world. Integration of Western influence, implementation of Mao Zedong's thought on art, and the formation of contemporary Chinese painting. GE credit: ArtHum, Div, Wrt.—Burnett

163D. Visual Arts of Early Modern China (4)
Lecture—3 hours; term paper. Prerequisite: course 163B or consent of instructor. Variable topics in Chinese art history during the 17th-19th centuries, considering artists' statements (visual and textual) within their historical contexts, asking what was at stake in the creation of new art forms. May be repeated for credit with consent of instructor. GE credit: ArtHum, Wrt, Div.—II. Burnett

164. The Arts of Japan (4)
Lecture—3 hours; term paper and/or gallery studies and review (determined by instructor each quarter course offered). Study of the significant achievements in architecture, painting, sculpture, and decorative arts from prehistoric age to nineteenth century. GE credit: ArtHum, Div, Wrt.

168. Great Cities (4)
Lecture—3 hours; term paper. Transformation in architecture and urban form in Paris, London, and Vienna in the context of varying social, political, and economic systems as well as very different cultural traditions, concentrating on the years 1830-1914. Offered in alternate years. GE credit: ArtHum, Wrt.

172A. Early Greek Art and Architecture (4)
Lecture—3 hours; term paper. Examination of the origin and development of the major monuments of Greek art and architecture from the eighth century to the mid-fifth century B.C. Not open for credit to students who have completed course 154A. (Same course as Classics 172A.) Offered in alternate years. GE credit: ArtHum, Wrt.—II. Roller

172B. Later Greek Art and Architecture (4)
Lecture—3 hours; term paper. Study of the art and architecture of later Classical and Hellenistic Greece, from the mid-fifth century to the first century B.C. Not open for credit to students who have completed course 154B. (Same course as Classics 172B.) Offered in alternate years. GE credit: ArtHum, Wrt.—II. Roller

173. Roman Art and Architecture (4)
Lecture—3 hours; term paper. The art and architecture of Rome and the Roman Empire, from the founding of Rome through the fourth century C.E. Not open for credit to students who have completed course 155. (Same course as Classics 173.) Offered in alternate years. GE credit: ArtHum, Wrt.—III. Roller

175. Architecture and Urbanism in Mediterranean Antiquity (4)
Lecture—3 hours; extensive writing. Prerequisite: a lower division Classics course (except 30, 31); course 1A recommended. Architecture and urban development in the ancient Near East, Greece, and Rome. Special emphasis on the social structure of the ancient city as expressed in its architecture, and on the interaction between local traditions and the impact of Greco-Roman urbanism. (Same course as Classics 175.) Offered in alternate years. GE Credit: ArtHum, Div, Wrt.—(II.) Roller

176A. Art of the Middle Ages: Early Christian and Byzantine Art (4)
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture of the early Christian era and Byzantine Empire: through

the later Roman Empire in the West and to the final capture of Constantinople in the East. GE credit: ArtHum, Wrt.

176B. Art of the Middle Ages: Early Medieval and Romanesque Art (4)
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture of western Europe in the early medieval era: from the rise of the barbarian kingdoms through the twelfth century. GE credit: ArtHum, Wrt.

176C. Art of the Middle Ages: Gothic (4)
Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture in northern Europe from the twelfth through the fifteenth centuries.

177A. Northern European Art (4)
Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the fifteenth century in Austria, Germany, France and the Lowlands, including such artists as Jan van Eyck and Hieronymus Bosch. GE credit: ArtHum, Wrt.

177B. Northern European Art (4)
Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the sixteenth century in Germany, France and the Lowlands, including such artists as Albrecht Dürer and Pieter Bruegel. GE credit: ArtHum, Wrt.

178A. Italian Renaissance Art (4)
Lecture—3 hours; term paper or gallery studies and review. Giotto and the origins of the Renaissance; painting and sculpture in Italy from Nicola Pisano through Lorenzo Monaco, with emphasis on Duccio, Giotto, and other leading artists of the early fourteenth century. GE credit: ArtHum, Wrt.—Ruda

178B. Italian Renaissance Art (4)
Lecture—3 hours; term paper or gallery studies and review. Early Renaissance in Florence; fifteenth-century artists from Donatello and Masaccio through Botticelli, in their artistic and cultural setting. GE credit: ArtHum, Wrt.—Ruda

178C. Italian Renaissance Art (4)
Lecture—3 hours; term paper or gallery studies and review. The High Renaissance: Leonardo, Michelangelo, Raphael, and Titian in their artistic and cultural settings—Florence, Rome, and Venice in the early sixteenth century. GE credit: ArtHum, Wrt.—I. (III.) Ruda

179B. Baroque Art (4)
Lecture—3 hours; term paper or gallery studies and review. Seventeenth-century painting, including such artists as Caravaggio, Rubens, Rembrandt, and Velázquez. Offered in alternate years. GE credit: ArtHum, Wrt.—(I.) Ruda

182. British Art and Culture, 1750–1900 (4)
Lecture—3 hours; term paper. Prerequisite: course 1C recommended. British painting in relation to the position of women in society and the rise of the middle-class art market. Topics include Hogarth and popular culture, Queen Victoria and the female gaze, and Pre-Raphaelite artists and collectors. Not offered every year. GE credit: ArtHum, Wrt.—III.

183A. Art in the Age of Revolution, 1750–1850 (4)
Lecture—3 hours; term paper. Prerequisite: course 1C recommended. Emergence of modernism in Europe from the late 18th century to the middle of the 19th century. Major artistic events viewed against a revolutionary backdrop of changing attitudes toward identity, race, and gender. Not offered every year. GE credit: ArtHum.—II.

183B. Impressionism and Post-Impressionism: Manet to 1900 (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1C recommended. Innovations of Impressionists, Post-Impressionists, and Symbolists in relation to social changes. Assessment of role of dealers and critics, myth of the artist-genius, and gender relations in French art and culture of the late 1800s. GE credit: ArtHum, Div, Wrt.—II. (II.)

183C. Modernism in France, 1880–1940 (4)
Lecture—10 hours; discussion—3 hours; fieldwork—11 hours. Course will take place as a 3-week summer course in France. A survey of gender and patronage in the development of modern art in France. Post-Impressionism, Fauvism, Cubism, and Surrealism are considered in relation to the intervention of dealers and women collectors in the formulation of modernism. GE credit: ArtHum, Div, Wrt.—IV. (IV.) Macleod

183D. Modern Sculpture (4)
Lecture—3 hours; term paper or gallery studies and review. Sculpture from Neo-Classicism to the present.

184. Twentieth Century Architecture (4)
Lecture—3 hours; term paper. Prerequisite: course 25 recommended. Major movements in architecture of the twentieth century in Europe and America. Formal innovations are examined within the social, political, and economic circumstances in which they emerged. GE credit: ArtHum, Wrt.—II.

185. Avant-Gardism and its Aftermath, 1917-1960 (4)
Lecture/discussion—4 hours. Prerequisite: one course in art history, or upper division standing and a major or minor in the arts or humanities recommended. Social, cultural, aesthetic, and theoretical development for artists and their audiences in the context of larger issues like the Mexican, Russian and German revolutions, WWI, the Depression, WWII, etc., and a critical-theoretical inquiry into questions of modernism, modernity, and avant-gardism. Offered in alternate years. GE Credit: ArtHum, Div, Wrt.—Stimson

186. Art After Modernism, 1948–Present (4)
Lecture/discussion—4 hours. Prerequisite: one course in art history, or upper division standing and a major or minor in the arts or humanities recommended. Social, cultural, aesthetic, and theoretical developments for artists and their audiences in the context of such larger issues as McCarthyism, the New Left, free love, feminism, Reaganomics, globalization, etc., and a critical-theoretical inquiry into questions of neoavantgardism, postmodernism, and postmodernity. Offered in alternate years. Not open for credit to students who have completed course 183E. GE credit: ArtHum, Div, Wrt.—I. Stimson

187. Contemporary Architecture (4)
Lecture—3 hours; term paper. Prerequisite: course 25 and/or course 184 recommended. Introduction to world architecture and urban design since circa 1966. Relation of influential styles, buildings, and architects to postmodern debates and to cultural, economic, technological and environmental change. Offered in alternate years. GE Credit: ArtHum, Div, Wrt.—I, II, III. Sadler

188A. The American Home (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 188B or any lower division course in Art History or Design; not open to freshmen. American domestic architecture and its responsiveness to changes in daily life from Colonial times to the present. Vernacular developments, effects of different socioeconomic conditions, and women's role in shaping the home receive special attention. GE credit: ArtHum, Div, Wrt.—Strazdes

188B. Architecture of the United States (4)
Lecture—3 hours; discussion—1 hour. Major movements from colonial times to the present. The role of buildings in a changing society, the interplay of styles with technologies of construction, the relationship between American and European developments, and developments of the architectural profession. GE credit: ArtHum, Wrt.—I. Strazdes

188D. American Painting and Sculpture to the Civil War (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one lower division Art History course or junior standing. Major movements in American painting and sculpture to 1865. Colonial portraiture, development of history painting, rise of genre painting, and the Hudson River School of landscape painting. Emphasis on European cultural currents and their effects. GE credit: ArtHum, Wrt.—(II.) Strazdes

188E. American Painting and Sculpture from the Civil War to World War II (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one lower division course in Art History or junior standing. Major developments in American painting and sculpture from 1865 to 1940. The American adaptations of Barbizon painting, French Impressionism, late 19th-century American Realism, the Ashcan School, Modernist Ideologies, Regionalism. GE credit: ArtHum, Wrt.—III. Strazdes

189. Photography in History (4)
Lecture/discussion—4 hours. Prerequisite: one course in art history, or upper division standing and a major or minor in the arts or humanities recommended. Social, cultural, aesthetic and technical developments in the history of photography including patronage and reception, commercial, scientific, political and artistic applications, and a critical-theoretical inquiry into photography's impact on the social category "art" and the history of subjectivity. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—III. (I.) Stimson

190A-H. Undergraduate Proseminar in Art History (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Art History major, minor, or other significant training in Art History recommended. Study of a broad problem or theoretical issue. Intensive reading, discussion, research, writing. Topics (A) Mediterranean Antiquity, (B) Medieval, (C) Renaissance, (D) American Art, (E) Gendering of Culture, (F) Chinese Art and Material Culture, (G) Japanese Art and Material Culture, (H) Late Modern Art and Theory. May be repeated one time for credit when topic differs.—I, II, III. (I, II, III.)

192. Internship (2–12)
Internship—term paper or catalogue. Supervised program of internships at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated one time for credit. (P/NP grading only.)

194H. Special Study for Honor Students (4)
Independent study—12 hours. Prerequisite: course 190 or the equivalent, as determined by the major adviser. Open only to students in the Art History Honors Program. Independent study of an art historical problem culminating in the writing of an honors thesis under the supervision of a faculty guidance committee.

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

200A. Visual Theory and Interpretive Methods (4)
Discussion—3 hours; extensive writing. Close study of selected recent developments in interpretive methodology used by art historians and other analysts of visual culture and the place of those developments within art history's history and in the larger field of social, cultural and historical analysis. May be repeated one time for credit.—I. (I.) Macleod, Stimson

200B. Research and Writing Methods in Art History (4)
Discussion—3 hours; term paper. Restricted to graduate students in art history. Development of the research, writing, and editing skills necessary for producing publishable work. Focus on reference tools used by art historians and the mechanics of scholarship, from question framing and organization of ideas to writing clear, effective prose.—II. (II.) Burnett, Ruda, Strazdes

200C. Thesis Writing Colloquium (1)
Discussion—1.5 hour; autotutorial. Prerequisite: course 200B, taken by all Art History M.A. students in their first year. Restricted to graduate students in

Art History. Meeting concurrently with AHI 200B, the colloquium provides a structured, supportive environment for second-year art-history graduate students drafting masters' theses. It offers a forum for technical discussions, discussion of writing/editing procedures, and peer review of writing in progress. (S/U grading only.)—II. (II.) Burnett, Strazdes

250. Problems in Art Historical Research (4)
Seminar—3 hours; term paper. Major topics in art historical research, emphasizing special methods of investigation, and of historical and critical analysis. May be repeated for credit.—II. Stimson

251. Seminar in Tribal Arts (4)
Seminar—3 hours; term paper. Selected topics in the art and aesthetics of small scale societies. May be repeated for credit when topic differs and with consent of instructor.

254. Seminar in Classical Art (4)
Seminar—3 hours; term paper. Selected areas of special study in classical art of the Greek and Roman tradition. Course may be repeated for credit with consent of instructor.

263. Seminar in Chinese Art (4)
Seminar—3 hours; term paper. Selected areas of special study in Chinese Art. May be repeated for credit with consent of instructor.—II. Burnett

276. Seminar in Medieval Art (4)
Seminar—3 hours; term paper. Selected areas of special study in medieval art from Early Christian to late Gothic. May be repeated for credit with consent of instructor.

278. Seminar in Italian Renaissance Art (4)
Seminar—3 hours; term paper. Selected areas of special study in Italian art from the fourteenth to the sixteenth century. May be repeated for credit with consent of instructor.—III. Ruda

283. Seminar in Visual Culture and Gender (4)
Seminar—3 hours; term paper. Selected areas of special study in the relationship between visual culture and gender in Europe and America from 1750 to present. May be repeated for credit with consent of instructor. Offered in alternate years.—I. Macleod

288. Seminar in European and American Architecture (4)
Seminar—3 hours; term paper. Exploration of selected topics in European and American architectural history with concentration on the Modern Period. May be repeated for credit with consent of instructor.—(II.) Strazdes

290. Special Topics in Art History (4)
Seminar—3 hours; term paper. Special research seminar in the theory or methods of Art History, or in a period of Art History. Topic will vary depending on the interests of the instructor or students. May be repeated for credit when topic differs and with consent of instructor. Not offered every year.—I, II, III.

292. Internship (1-4)
Internship—3-12 hours. Prerequisite: graduate student; consent of instructor. Supervised internship at professional art or cultural institution including museums, galleries, archives, government offices, visual resources libraries, etc. May be repeated up to eight units for credit. Graduate students in Art History only. Not offered every year. Limited enrollment. (S/U grading only.)

298. Directed Group Study (1-5)
(S/U grading only.)

299. Individual Study (1-6)
(S/U grading only.)

Professional Courses

Note: Various of the below courses are not offered each year; check the quarterly *Class Schedule and Registration Guide*.

390. Introduction to Teaching Art History for Teaching Assistants (1)
Discussion—1 hour. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of undergraduate art history. (S/U grading only.)

396. Teaching Assistant Training Practicum (4)
Seminar—2 hours; Practice—10 hours. Prerequisite: graduate standing. Principles and techniques of the effective teaching of undergraduate courses in the history of art. May be repeated for credit as often as the student is awarded a TA-ship. (S/U grading only.)—I, II, III. (I, II, III.)

Professional Courses

401. Museum Training: Curatorial Principles (4)
Seminar—3 hours. Approved for graduate degree credit. Study of private and public collections. Museum personalities. Appraisal of works of art; ethics of appraisal. Auction and sales: methods and catalogues. Registration. Technical problems of the museum. Connoisseurship. Collateral reading. Visits to museums. Seminar with assigned papers.—II.

402. Museum Training: Exhibition Methods (4)
Seminar—3 hours; exhibition. Approved for graduate degree credit. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms.—(II.)

Art Studio

(College of Letters and Science)

_____, Chairperson of the Department

Department Office. 101 Art Building
(530) 752-0105; *http://art.ucdavis.edu*

Faculty

Tom Bills, M.F.A., Professor
Matthias Geiger, M.F.A, Assistant Professor
William Henderson, M.F.A., Professor
Robin Hill, B.F.A., Professor
David Hollowell, M.F.A., Professor
Darrin Martin, M.F.A., Associate Professor
Hearne Pardee, M.F.A., Professor
Lucy Puls, M.F.A., Professor
Annabeth Rosen, M.F.A., Professor
Youngsuk Suh, M.F.A., Assistant Professor
Gina Werfel, M.F.A., Professor

Emeriti Faculty

Conrad Atkinson, R.A.S. (honors), Professor Emeritus
Roy DeForest, M.A., Professor Emeritus
Lynn Hershman, M.A., Professor Emerita
Harvey Himelfarb, M.A., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Malaquias Montoya, B.F.A., Professor Emeritus
Maunel Neri, Professor Emeritus
Roland C. Petersen, M.A., Professor Emeritus
Cornelia Schulz, M.F.A., Professor Emerita, *Academic Senate Distinguished Teaching Award*
Wayne Thiebaud, M.A., hon. D.F.A. (C.C.A.C., D.C.) Professor Emeritus, *UC Davis Prize for Teaching and Scholarly Achievement*

The Major Program

The studio art major provides the knowledge and experience necessary for a broad understanding of practice and interpretation of the visual arts.

The Program. For the beginning student, the major offers an introduction to a variety of visual methodologies. Students may then advance to upper division coursework in drawing, painting, sculpture, printmaking, ceramic sculpture, photography, video and electronic arts, as well as theory and criticism.

Portfolios. Portfolios are not required for admission to the major. However, admitted students, once enrolled, should keep a continuing portfolio of their art work, which can be evaluated at such times as when the student is requesting independent study courses and scheduling an exhibition in the student gallery.

Career Alternatives. The studio art graduate is prepared for graduate work in the visual arts or continuing development as a professional artist or art teacher. Students who have career aspirations in the commercial aspects of the visual arts can acquire a broad general education and a creative foundation in the art studio major, establishing a basis for further specialization in commercial art.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**32**
Five courses chosen from Art Studio 2, 4, 5, 7, 8, 9, 11, 12	20
Three lecture courses chosen from Art Studio 24, 26, 30, or Art History 1A, 1B, 1C, 1D, 1E, 5, 10, 25	12
Depth Subject Matter	**44**
Nine courses, chosen from Art Studio 101, 102A, 102B, 103A, 103B, 105A, 105B, 105C, 110A, 110B, 111A, 111B, 113, 114A, 114B. 114C, 114D, 117, 121, 125A, 125B, 125C, 125D, 129, 138, 142A, 142B, 143A, 143B, 147, 148, 150, 151, 152A, 152B, 152C, 152D, 152E, 152F, 152G, 171, 190	36
Any two upper division Art History courses	8
Total Units for the Major	**76**

Major Advisers. Information on the current Academic Advisors can be obtained by contacting the Art Department Main Office at (530) 752-0105.

Minor Program Requirements:

	UNITS
Art Studio	**20**

Prerequisite courses must be taken prior to enrollment in upper division courses. Independent study courses are not applicable.

Upper division art studio courses in two of the following areas:
Area 1 (Painting, Drawing, Printmaking)
Area 2 (Sculpture and Ceramic Sculpture)
Area 3 (Photography and Video) 20
Note: One lower division substitute course permissible

Teaching Credential Subject Representative. Department Chairperson; see the Teacher Education program.

Graduate Study. The Department of Art offers programs of study and research leading to the M.F.A. degree in the practice of art. For more information contact the Graduate Staff Adviser at (530) 752-8710.

Courses in Art Studio (ART)

Lower Division Courses

2. Beginning Drawing (4)
Studio—6 hours. Introduction to drawing using various black and white media. Drawing techniques covered are contour line, ink bleeds, rendering, "blind" drawing, and self portraiture.—I, II, III, IV. (I, II, III, IV.)—Henderson, Hollowell, Pardee, Puls, Werfel

4. Beginning Figure Drawing (4)
Studio—6 hours. Prerequisite: course 2. Form in composition using the human figure as subject.—Hollowell, Pardee, Werfel

5. Beginning Sculpture (4)
Studio—6 hours. Basic sculpture techniques using a variety of media. Form in space using cardboard, plaster, and/or cement, wood and/or metal and other media.—I, II, III. (I, II, III.) Bills, Hill, Puls

7. Beginning Painting (4)
Studio—6 hours. Introduction to techniques and concepts in the practice of painting.—Henderson, Hollowell, Pardee, Werfel

8. Beginning Ceramic Sculpture (4)
Studio—6 hours. Introduction to ceramic sculpture construction and processes.—Rosen

9. Beginning Photography (4)
Studio—6 hours. Introduction to the fundamental technical, aesthetic, and formal aspects of photography. Camera skills, film developing and printing in the black and white darkroom.—Geiger, Suh

10. Introduction to Art Appreciation (3)
Lecture—3 hours. The understanding and appreciation of painting, sculpture, architecture and industrial art. Illustrated lectures. Intended for non-majors. GE credit: ArtHum.

11. Beginning Printmaking (4)
Studio—6 hours. Introduction to printmaking techniques such as monography, relief, and intaglio. Investigation of personal imagery through use of these techniques.

12. Beginning Video (4)
Studio—6 hours. Production techniques of video shooting, editing, lighting, sound and effects. A conceptual framework for video-art techniques.—Martin

24. Introduction to Experimental Video and Film (4)
Lecture—3 hours; discussion—1 hour; term paper. Evolution of moving image technologies. Shifts within avant-garde artistic practices. Conceptual and historical differences between film and video. Offered in alternate years. GE Credit: ArtHum.—(I.) Martin

26. Photospectacle (4)
Lecture—3 hours; discussion—1 hour; term paper. Photography as performance-based art. History of performance art and performances designed specifically for the camera. Offered in alternate years. GE Credit: ArtHum, Wrt.—(I.) Geiger, Suh

30. Introduction to Contemporary Visual Culture (4)
Lecture—3 hours; discussion/laboratory—1 hour. Establishing visual literacy across the media of fine art, photography, advertising, television and film; media culture; focus on critical decoding of contemporary visual culture. GE credit: ArtHum, Div, Wrt.—II. (I.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

Pre-enrollment in upper division courses is restricted to art majors.

101. Intermediate Painting (4)
Studio—6 hours. Prerequisite: courses 2, 7. Individualized projects exploring color and space in a variety of subject matter and approaches. Builds on basic skills and concepts from beginning drawing and painting courses. Study of historical and contemporary art in relation to studio practice.—Henderson, Hollowell, Pardee, Werfel

102A. Advanced Painting: Studio Projects (4)
Studio—6 hours. Prerequisite: course 101. Sustained development of painting for advanced students. Approaches will vary according to the instructor. Pass 1 restricted to Art Studio majors. May be repeated for credit one time.—Henderson, Hollowell, Iliatova, Pardee, Werfel

102B. Advanced Painting: Figure (4)
Studio—6 hours. Prerequisite: course 101. Advanced painting using the human figure as subject. Pass1 restricted Art Studio majors. May be repeated for credit one time.—Henderson, Hollowell, Pardee, Werfel

102C. Advanced Painting: Special Topics (4)
Studio—6 hours. Prerequisite: courses 2, 7, 101; course 102A or 102B. Special topics in painting for upper division students. Emphasis on development of a personal practice of painting informed by awareness of contemporary issues in painting and their historical background. Topics will vary with instructor. Pass1 restricted Art Studio majors. May be repeated for credit one time.—Henderson, Hollowell, Pardee, Werfel

103A. Intermediate Drawing: Black and White (4)
Studio—6 hours. Prerequisite: courses 2. Advanced study of drawing composition using black and white media. Pass1 restricted Art Studio majors.—Henderson, Hollowell, Pardee, Werfel

103B. Intermediate Drawing: Color (4)
Studio—6 hours. Prerequisite: courses 2. Study of drawing composition in color media. Pass1 restricted Art Studio majors.—Henderson, Hollowell, Pardee, Werfel

105A. Advanced Drawing: Studio Projects (4)
Studio—6 hours. Prerequisite: courses 2; course 103A or 103B. Exploration of composition and process in drawing. Emphasis on the role of drawing in contemporary art and on drawing as an interdisciplinary practice. Pass1 restricted Art Studio majors. May be repeated for credit one time.—Henderson, Hollowell, Pardee, Werfel

105B. Advanced Drawing: Figure (4)
Studio—6 hours. Prerequisite: courses 4; course 103A or 103B. Study of the figure through drawing of the model. Exploration of different methods and process of figure-drawing. Pass1 restricted Art Studio majors. May be repeated for credit one time.—Henderson, Hollowell, Pardee, Werfel

110A. Intermediate Photography: Black and White Analog (4)
Studio—6 hours. Prerequisite: course 9. Introduction to 35mm and medium format camera. Development of personal aesthetic and portfolio of black and white prints. Pass1 restricted Art Studio majors.—Geiger, Suh

110B. Intermediate Photography: Digital Imaging (4)
Studio—6 hours. Prerequisite: course 9. Comprehensive introduction to all elements of digital photography, including scanning, imaging software and printing. Pass1 restricted Art Studio majors.—Geiger, Suh

111A. Advanced Photography: Special Topics (4)
Studio—6 hours. Prerequisite: courses 9 and 110A. Restricted to Art Studio majors in pass 1. Special topics related to photography and contemporary art practice. Multiple projects in a variety of approaches. May be repeated two times for credit.—Geiger, Suh

111B. Advanced Photography: Digital Imaging (4)
Studio—6 hours. Prerequisite: courses 9, 110B. In depth exploration of digital photography, including refined digital imaging techniques. Theoretical issues involved in digital media. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Geiger, Suh

112. Sound for Vision (4)
Studio—6 hours. Prerequisite: course 12 or Technocultural Studies 100. Sound composition and development of an audio databank. Study of repetition and phase shifts. Creation of descriptive acoustic space recordings in combination with other artistic media. Audio as stand alone or accompaniment. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Martin

113. Interdisciplinarity Art (4)
Studio—6 hours. Prerequisite: Upper division standing in Art Studio, Theater and Dance, Design, Technocultural Studies, or Music. Experimental interdisciplinary strategies. Use of various media in creation of collaborative or independent works. Production of participatory audio-visual works, installations, or two dimensional explorations. May be repeated for credit one time.—Geiger, Hill, Martin, Puls, Suh

114A. Intermediate Video: Animation (4)
Studio—6 hours. Prerequisite: course 12 or Technocultural Studies 100 and one drawing course. Exploration of animation. Relationship between drawing, digital stills, and multiple images. Animation using traditional drawing techniques, collage, and digital processes. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Martin

114B. Intermediate Video: Experimental Documentary (4)
Studio—6 hours. Prerequisite: course 12 or Technocultural Studies 100. Experimental documentary practice. Use of interviews, voice-overs, and still and moving images. Production of alternative conceptual and visual projects. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Martin

114C. Intermediate Video: Performance Strategies (4)
Studio—6 hours. Prerequisite: course 12 or Technocultural Studies 100. Use of video to expand performance art production. Exploration of improvisation, direction, projection, and image processing in real time. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Martin

117. Advanced Video and Electronic Arts (4)
Studio—6 hours. Prerequisite: course 12 or Technocultural Studies 100; one of course112, 114A, 114B, or 114C; upper division standing Art Studio Majors. Independently driven video, digital, and/or performance projects. Further development in the electronic arts ranging from video installation to performance. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Martin

121. Reinterpreting Landscape (4)
Studio—6 hours. Prerequisite: courses 2, 7. Interpretation of landscape through painting, drawing, and related media. Emphasis on the integration of historical, cultural, natural, and artistic contexts. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Pardee, Werfel

125A. Intermediate Printmaking: Relief (4)
Studio—6 hours. Prerequisite: course 11. Woodcut linocut, metal-plate, relief, and experimental uses of other materials for printmaking. Additive and reductive relief techniques. May be repeated for credit one time. Pass1 restricted Art Studio majors.

125B. Intermediate Printmaking: Intaglio (4)
Studio—6 hours. Prerequisite: course 11. Metal plate etching, aquatint, hard and soft ground, burin engraving and related printmaking techniques. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Berry

125C. Intermediate Printmaking: Lithography (4)
Studio—6 hours. Prerequisite: course 11. Stone and metal-plate lithography and other planographic printmaking methods. Exploration of the basic chemistry and printing procedure inherent in stone lithogrphay. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Berry

125D. Intermediate Printmaking: Serigraphy (4)
Studio—6 hours. Prerequisite: course 11. Printmaking techniques in silk screen and related stencil methods. Development of visual imagery using the language of printmaking. May be repeated for credit one time. Pass1 restricted Art Studio majors.

129. Advanced Printmaking (4)
Studio—6 hours. Prerequisite: completion of two of: 125A, 125B, 125C, or 125D. Development of intermedia printmaking. Advanced modes in print technologies: relief, serigraphy, intaglio, surface, as well as addition of digitized imagery. May be repeated for credit two times. Pass1 restricted Art Studio majors.

138. The Artist's Book (4)
Studio—6 hours. Prerequisite: completion of three upper division Art Studio courses. Creation of an artist's book in an edition of three. Use of a variety of

media. May be repeated for credit one time. Pass1 restricted Art Studio majors. Offered in alternate years.—Geiger, Hill, Suh

142A. Intermediate Ceramic Sculpture: Mold Work (4)
Studio—6 hours. Prerequisite: course 8. Creation of ceramic sculpture employing moldworking processes such as: slip casting, hump molds, and sprigging. Pass1 restricted Art Studio majors.—Rosen

142B. Intermediate Ceramic Sculpture: Clay, Glaze, and Kiln (4)
Studio—6 hours. Prerequisite: course 8. Study and practice of glaze formation. Concentration on the use of color in ceramic sculpture. Practical experience with kiln firing. Pass1 restricted Art Studio majors.—Rosen

143A. Advanced Ceramic Sculpture: Studio Projects (4)
Studio—6 hours. Prerequisite: course 8; 142A or 142B. Exploration of ceramic fabrication. Hollow and solid building, casting, throwing, using fired, found, and fabricated ceramic elements. May be repeated for credit two times. Pass1 restricted Art Studio majors.—Rosen

143B. Advanced Ceramic Sculpture: Issues in Contemporary Ceramics (4)
Studio—6 hours. Prerequisite: course 8; 142A or 142B. Individual studio work in conjunction with readings, field trips, critiques and writing about contemporary ceramic art. May be repeated for credit two times. Pass1 restricted Art Studio majors.—Rosen

147. Theory and Criticism of Photography (4)
Lecture—3 hours; term paper. Prerequisite: course 9. Development of camera vision, ideas, and aesthetics and their relationship to the fine arts from 1839 to the present. Offered in alternate years. GE credit: ArtHum, Wrt.—Geiger, Suh

148. Theory and Criticism: Painting and Sculpture (4)
Lecture—3 hours; term paper. Prerequisite: course 5 or 7. Study of forms and symbols in historic and contemporary masterpieces. Offered in alternate years. GE credit: ArtHum, Wrt.—I. Thiebaud

149. Introduction to Critical Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: two of Art History 1B, 1C, or 183F. An overview of 20th century critical theories of culture and their relation to visual art and mass media culture. GE credit: ArtHum, Div, Wrt.

150. Theory and Criticism of Electronic Media (4)
Lecture—3 hours; term paper. Prerequisite: course 24 recommended. Study of electronic media, focusing on critique, application, and relationship to art practice. Analysis of the conceptual basis of electronic media as an artistic mode of expression. Offered in alternate years. GE credit: ArtHum, Wrt.—(I.) Martin

151. Intermediate Sculpture (4)
Studio—6 hours. Prerequisite: course 5. Individualized explorations through multiple projects in a variety of sculpture media and techniques. Builds upon technical skills and concepts covered in course 5. May be repeated one time for credit when topic differs.—I, II, III. (I, II, III.) Bills, Hill, Puls

152A. Advanced Sculpture: Studio Projects (4)
Studio—6 hours. Prerequisite: courses 5, 151. Sculpture for advanced students. Emphasis on concept, idea development and honing technical skills. Approaches and projects will vary according to the instructor. May be repeated for credit one time when topic differs. Pass1 restricted Art Studio majors.—Bills, Hill, Puls

152B. Advanced Sculpture: Material Explorations (4)
Studio—6 hours. Prerequisite: courses 5, 151. Primary application and exploration of a single sculpture material chosen by the student. Examination of its properties, qualities, and characteristics for three-dimensional expression. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Puls

152C. Advanced Sculpture: Concepts (4)
Studio—6 hours. Prerequisite: courses 5, 151. Investigation of a specific idea chosen by the class. Relationship of idea to form and content. Individual development of conceptual awareness. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Puls

152D. Advanced Sculpture: Metals (4)
Studio—6 hours. Prerequisite: courses 5, 151. Technical aspects of the use of metals in contemporary art practice. Projects assigned to demonstrate the evolution of concepts and processes. May be repeated for credit one time. Pass1 restricted Art Studio majors. Bills

152E. Advanced Sculpture: Site Specific Public Sculpture (4)
Studio—6 hours. Prerequisite: courses 5, 151. Place and site specificity in contemporary sculpture. Individual and group work to conceive and fabricate sculpture in a public space. May be repeated for credit one time. Pass1 restricted Art Studio majors.—Hill

152F. Advanced Sculpture: Figure (4)
Studio—6 hours. Prerequisite: courses 5, 151. Exploration of historical and contemporary approaches to the body in three-dimensions. Projects based on observational and conceptual strategies. Variety of media and techniques, including clay, wax, plaster, plastics, found objects, and others. May be repeated for credit one time. Pass1 restricted Art Studio majors.

152G. Advanced Sculpture: The Miniature and Gigantic (4)
Studio—6 hours. Prerequisite: courses 5, 151. Exploration of scale, from the very small to the very large in a series of projects in a variety of media. Tools and techniques of enlargement and miniaturization. May be repeated for credit one time. Pass1 restricted Art Studio majors.

171. Mexican and Chicano Mural Workshop (4)
Studio—8 hours; independent study—1 hour. Prerequisite: Chicana/o Studies 70 and/or written consent of instructor. The Mural: a collective art process that empowers students and people through design and execution of mural paintings in the tradition of the Mexican Mural Movement; introduces materials and techniques. May be repeated one time for credit. (Same course as Chicana/o Studies 171.)—III. (III.)

190. Seminar in Art Practice (4)
Studio—6 hours. Prerequisite: upper division standing Art Studio major. I Introduction to professional practices. Development of an artist's packet including a resume, cover letter, artist statement, and statement of purpose. Ongoing independent studio work with group critiques. Research on galleries and museums, and readings in contemporary theory and criticism. Pass1 restricted Art Studio majors.—I, II, III. (I, II, III.) Hill, Puls, Rosen, Werfel

192. Internship (2-12)
Internship. Supervised program of internships in artists' studios and at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated for credit for a total of 12 units. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

290. Seminar (4)
Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit.—I, II, III. (I, II, III.)

291. Seminar: Critical Evaluation (1)
Seminar—1 hour. May be repeated for credit. (S/U grading only.)—II. (II.)

292. Seminar: Comprehensive Qualifying (1)
Seminar—1 hour. Further critical evaluation of the student's work to determine his eligibility to begin the Comprehensive Project. May be repeated for credit. (S/U grading only.)—(I.)

299. Individual Study (1-6)
(S/U grading only.)

299D. Comprehensive Project (9)
An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be repeated for credit. (S/U grading only.)—III. (III.)

Professional Courses

Note: Various of the below courses are not offered each year; check the quarterly *Class Schedule and Registration Guide*.

401. Museum Training: Curatorial Principles
Seminar—3 hours; papers. Approved for graduate degree credit. Study of private and public collections. Museum personalities. Appraisal of works of art; ethics of appraisal. Auction and sales: methods and catalogues. Registration. Technical problems of the museum. Connoisseurship. Collateral reading. Visits to museums. Offered in alternate years.—(III.)

402. Museum Training: Exhibition Methods (4)
Seminar—3 hours; exhibition. Approved for graduate degree credit. History of exhibition methods in private and public collections. Comparisons of different types of museums and their exhibition problems. Lighting and techniques of display with emphasis on actual design. Experimentation with unusual presentation forms. Offered in alternate years.—(II.)

Asian American Studies

(College of Letters and Science)

Nolan Zane, Ph.D., Chairperson of the Department

Program Office. 3102 Hart Hall
(530) 752-3625; *http://asa.ucdavis.edu*

Committee in Charge

Darrell Y. Hamamoto, Ph.D.
(Asian American Studies)
Bill Ong Hing, J.D.
(School of Law, Asian American Studies)
Wendy Ho, Ph.D. *(Asian American Studies, Women and Gender Studies)*
Richard S. Kim, Ph.D. *(Asian American Studies)*
Sunaina Maira, Ed.D. *(Asian American Studies)*
Susette Min, Ph.D. *(Asian American Studies)*
Stanley Sue, Ph.D.
(Psychology, Asian American Studies)
Caroline Kieu Linh Valverde, Ph.D.
(Asian American Studies)
Nolan Zane, Ph.D.
(Psychology, Asian American Studies)

Faculty

Darrell Y. Hamamoto, Ph.D., Professor
Bill Ong Hing, J.D., Professor
Wendy Ho, Ph.D., Associate Professor
Richard S. Kim, Ph.D., Assistant Professor
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Susette Min, Ph.D., Assistant Professor
Stanley Sue, Ph.D., Professor

Caroline Kieu Linh Valverde, Ph.D., Assistant Professor
Nolan Zane, Ph.D., Professor

Emeriti Faculty

Isao Fujimoto, M.A., Senior Lecturer Emeritus

The Major Program

The Asian American Studies Program offers an interdisciplinary major that examines the experiences of various Asian American groups in the United States. Pertinent to these experiences are the historical, cultural, legal, political, social-psychological, class, racial, and gender contexts for Asian Americans.

The Program. Majors take a prescribed set of lower division and upper division courses in Asian American Studies.

Career Alternatives. Asian American Studies prepares students for a variety of careers. Given the multicultural nature of society and the increasing relations with different societies, many occupations seek individuals with background and expertise in ethnic relations and cultural issues. Graduates often enter the fields of teaching, research, government service, law, social services, etc., as well as graduate schools for advanced degrees in various disciplines.

A.B. Major Requirements:

UNITS

Humanities Emphasis

Preparatory Subject Matter 34

Asian American Studies 1, 2, 20 11
One Asian language: Chinese 1, 2, 3; Japanese 1, 2, 3; or equivalent Asian language..... 15
Note: For courses in Asian languages, see Chinese and Japanese (under East Asian Languages and Cultures). For other Asian courses, see East Asian Languages and Culture and East Asian Studies.
At least two lower division courses from the following departments or programs: African American and African Studies, Chicana/o Studies, Native American Studies, Women and Gender Studies (all lower division courses of at least 4 units are acceptable except those numbered 92, 97T, 98, and 99)..... 8

Depth Subject Matter 44-47

At least seven upper division Asian American Studies courses (excluding 197T, 198, 199) and not more than 6 units of internships..... 28-30
Select four courses from one of the following tracks..... 16-17

Literature/Culture Track
Comparative Literature 153; Dramatic Art 154, 155; English 178, 179, 185A, 185B

History/Culture Track
Dramatic Art 154, 155; History 191F, 194C, 196B, 173, 178

Total Units for the Major 78-81

Social Science Emphasis

Preparatory Subject Matter 32

Asian American Studies 1, 2 8
Select four courses from the following:
Anthropology 2, 4, 20; Communication 1, 3; Human Development 30; Psychology 41; Sociology 46A, 46B; Statistics 13 (at least two of the courses must be methodological/statistical in nature and selected from Anthropology 2; Psychology 41; Sociology 46A, 46B, or Statistics 13)..... 16
At least two lower division courses from the following departments or programs:
African American and African Studies, Chicana/o Studies, Native American Studies, Women and Gender Studies (all lower division courses of at least 4 units are acceptable except those numbered 92, 97T, 98, and 99) 8

Depth Subject Matter 44-46

At least seven upper division Asian American Studies courses (excluding 197T, 198, 199) and not more than 6 units of internships..... 28-30
Select four courses from one of the following tracks 16

Anthropology Track
Anthropology 123BN, 132, 133, 134, 138, 139AN, 143B, 147

Sociology/Psychology Track
Human Development 103; Psychology 142; Sociology 125, 128, 129, 130, 172

Total Units for the Major 76-78

Major Adviser. MD. Nguyen (530) 752-4447 or *mdnguyen@ucdavis.edu*

Substitutions for disciplinary track courses will be considered by the Program Director on a case by case basis. Likewise, any substitutions of Major/Minor criteria will be considered by the Program Director.

Minor Program Requirements:

UNITS

Asian American Studies 20

Five courses from Asian American Studies 100, 110, 111, 112, 120, 130, 136, 140, 150, 150B, 150C, 150D, 155, 192, 198, and 199 (no more than 4 units of 192, 198, and 199 may be counted toward this total)

Minor Adviser. MD. Nguyen (530) 752-4447 or *mdnguyen@ucdavis.edu*

American History and Institutions. This university requirement can be satisfied by one of the following courses in Asian American Studies: 1, 2; see also under University Requirements.

Courses in Asian American Studies (ASA)

Direct questions pertaining to the following courses to the instructor or to Asian American Studies Program in 3102 Hart Hall (530) 752-3625.

Lower Division Courses

1. Historical Experience of Asian Americans (4)
Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through an overview of the history of Asians in America from the 1840s to the present within the context of the development of the United States. GE credit: SocSci, Div, Wrt.—I, II, III. (I, II, III.)

2. Contemporary Issues of Asian Americans (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to Asian American Studies through the critical analysis of the impact of race, racism, ethnicity, imperialism, militarism, and immigration since post-World War II on Asian Americans. Topics may include sexuality, criminality, class, hate crimes, and inter-ethnic relations. GE credit: SocSci, Div, Wrt.—I, II, III. (I, II, III.)

3. Social and Psychological Perspectives of Asian Americans (4)
Lecture—3 hours; discussion—1 hour. Major psychosocial issues of Asian Americans. Theories and empirical research that address cultural values, behavioral norms, ethnic stereotypes, racism, acculturation, ethnic identity development, family communication, stressors and social support systems, academic achievement, interpersonal effectiveness, and psychopathology. GE credit: SocSci, Div.—I, II, III. (I, II, III.) Zane, Sue

4. Asian American Cultural Studies (4)
Lecture—3 hours; discussion—1 hour. This interdisciplinary course examines the multiple ways in which race, class, sexuality and gender, as well as the recent turn to transnationalism and postcolonial theory, have changed the ways we read Asian American literature and see art, theater and film. GE credit: ArtHum, Div, Wrt.—III. (I.) Hamamoto, Ho, Min

92. Internship (1-3)
Internship—3-9 hours. Prerequisite: enrollment dependent on availability of intern positions and consent of instructor. Supervised internship in community and institutional settings related to Asian American concerns. (P/NP grading only.)

98. Directed Group Study (1-5)
Primarily intended for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

100. Asian American Communities (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2, or 3, or consent of instructor. Survey and analysis of Asian American communities within both historical and contemporary contexts. Presentation of the analytical skills, theories, and concepts needed to describe, explain, and understand the diversity of Asian American communities within the larger, dominant society. GE credit: SocSci, Div.—III. (II.) Hamamoto, Kim, Maira

110. Theoretical Perspectives in Asian American Studies (4)
Lecture/discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Theories of race and ethnic relations as tools for understanding the Asian American experience with the society as the unit of analysis. GE credit: SocSci, Div.—I, II. (I, II.) Hamamoto, Kim, Valverde

112. Asian American Women (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2, or 3, or consent of instructor. Experiences of Asian American women from major ethnic subgroups comparatively examined in their social, economic and historical contexts using theoretical perspectives from social sciences, humanities/arts: identity, racialization, immigration, gender, sexuality, labor, socialization, cultural expression, social movements and feminist theorizing. GE credit: ArtHum or SocSci, Div.—I. (I.) Ho

113. Asian American Sexuality (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2, or 3. Restrictive US immigration laws, labor exploitation, race-based exclusionary laws, removal and internment, anti-miscegenation laws, and other examples of social control are surveyed to assess their role in shaping the sexuality of the different Asian American groups.—II. (II.) Hamamoto

114. Asian Diasporas (4)
Lecture—4 hours. Prerequisite: course 1 or 2; upper division status or consent of instructor. Asian diasporic communities and the experiences of its members in the United States and internationally. Community building, cyberspace, gender issues, labor, transnational practices, effects of globalization, political organizing, homeland politics, humanitarian projects, citizenship and nationalism. Offered in alternate years. GE credit: SocSci, Div.—III. (III.) Kim, Valverde

115. Multiracial Asian Pacific American Issues (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2, or 3, or consent of instructor. Introduction to the experiences of biracial and multiracial Asian Pacific people in the U.S., concentrating on theories of race, racial identity formation, culture, media, and anti-racist struggles. Critical approaches to the analysis of popular media and academic representations. Offered in alternate years.—I. Kieu Linh Valverde

116. Asian American Youth (4)
Lecture—3 hours; term paper. Prerequisite: course 1, 2, or 3. Social experiences of diverse groups of Asian American youth. Ways in which youth themselves actively create cultural expressions and political interventions. GE credit: Div.—I. Maira, Parreñas

120. Multiracial Asian Pacific American Issues (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2, or 3, or consent of instructor. Introduction to the experiences of biracial and multiracial Asian Pacific

people in the U.S., concentrating on theories of race, racial identity formation, culture, media, and anti-racist struggles. Critical approaches to the analysis of popular media and academic representations. Offered in alternate years. GE credit: Div.—Valverde

121. Asian American Performance (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2, or 3, or consent of instructor. Performance work by, for, and/or about Asian Pacific Americans including dramatic literature, performance art, dance, and film. Ethnicity, gender and sexuality, class and age as they intersect with Asian Pacific American identities in and through dramatic performance. Offered in alternate years.—Min

130. Asian American Literature (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2 or 3 or consent of instructor. Works of Asian American literature by writers from the major ethnic subgroups, examined in their social, economic and historical contexts. Intertextual analysis of their thematic and formal elements to form an understanding of Asian American literary traditions. GE credit: ArtHum, Div.—II. Ho, Min

131. Ethnicity, Culture, and the Self (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 3. Cultural and social psychological influences on Asian Americans focusing on the individual. GE credit: SocSci, Div.—II. (II.) Sue, Zane

132. Health Issues Confronting Asian Americans and Pacific Islanders (4)
Lecture/discussion—4 hours. Health issues confronting Asian Americans and Pacific Islanders. (Same course as Public Health Sciences 132.)—Chen

140. Asian Americans and Media (4)
Lecture—4 hours. Prerequisite: course 1 or 2. Upper division standing. The politics of Asian American representation in print, radio, television, film, and new media will be examined in tandem with sustained discussion of alternatives offered by independent Asian American media arts. GE credit: ArtHum, Div, SocSci, Wrt.—I. (I.) Hamamoto

150. Filipino American Experience (4)
Lecture/discussion—4 hours. Prerequisite: course 1 or 2. Examination of the relationship between the Filipino-American community, the Philippine home community and the larger American society through a critical evaluation of the historical and contemporary conditions, problems and prospects of Filipinos in the U.S.—(I.)

150B. Japanese American Experience (4)
Lecture—3 hours; term paper. Prerequisite: course 1 and upper division standing or consent of instructor. Analytical approaches to understanding Japanese American history, culture and society. Offered in alternate years. GE credit: SocSci, Div, Wrt.—II. Hamamoto

150C. Chinese American Experience (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2, or 3, or consent of instructor. Survey of the historical and contemporary experiences of Chinese in the United States, starting with the gold rush era and concluding with the present-day phenomenon of Chinese transnational movement to the United States and its diasporic significance. Offered in alternate years. GE credit: SocSci, Div.—Ho

150D. Korean American Experience (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2, or 3 or consent of instructor. Interdisciplinary survey of the historical and contemporary experiences of Koreans in the United States from the late nineteenth century to the present. Offered in alternate years. GE credit: SocSci, Div.—Kim

150E. Southeast Asian American Experience (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2, or 3, or consent of instructor. Upper division status. Historical survey of Southeast Asian experiences with special focus on United States involvement and post 1975 migrations. Defines international and transnational conditions that led up to the large exodus and resettlement of Southeast Asians. Offered in alternate years. GE credit: SocSci, Div.—(III.) Valverde

150F. South Asian American History, Culture, & Politics (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2, 3, or 4 or consent of instructor. South Asian American experiences, focusing on the histories, cultures, and politics of Indian, Pakistani, Bangladeshi, and Sri Lankan communities in the U.S. Interdisciplinary approaches to migration, labor, gender, racialization, ethnicity, youth, community mobilization. Offered in alternate years. GE credit: ArtHum, SocSci—I. (II.) Maira

155. Asian American Legal History (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 2, or 3 or consent of instructor. Legal history of Asian Americans, from the mid-19th century to present. Laws and administrative policies affecting Asian American communities, including those governing immigration, social and economic participation, WWII internment, and affirmative action.—(II.)

189A-I. Topics in Asian American Studies (4)
Lecture—4 hours. Prerequisite: course 1, 2, or 3 and upper division standing, or consent of instructor. Intensive treatment of a topic in Asian American Studies. (A) History; (B) Culture; (C) Health; (D) Policy and Community; (E) Comparative Race Studies; (F) Asian and Asian American Studies; (G) Race, Class, Gender, and Sexuality; (H) Society and Institutions; (I) Politics and Social Movements. May be repeated for credit when topic differs. Not offered every year.

192. Internship (1-5)
Internship—3-15 hours. Prerequisite: enrollment dependent on availability of intern position with priority to Asian American Studies minors. Supervised internship in community and institutional settings related to Asian American concerns. (P/NP grading only.)

197T. Tutoring in Asian American Studies (1-5)
Tutoring—1-5 hours. Prerequisite: upper division standing and completion of appropriate course with distinction; consent of instructor. Tutoring in lower division Asian American Studies courses in small group discussion. Weekly meetings with instructor. May be repeated for credit once for a given course and also for a different course. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. Primarily intended for upper division students. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Asian Studies

See Asian American Studies, on page 167; East Asian Languages and Cultures, on page 213; and East Asian Studies, on page 217.

Astronomy

See Physics, on page 451.

Atmospheric Science

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Land, Air and Water Resources, on page 354.

The Major Program

Atmospheric science is the study of the air that surrounds the planet. It includes all weather phenomena and climate including the chemistry of trace constituents and cloud and particle formation, as well as quantitative studies of severe weather events such as hurricanes and tornadoes. It includes the study of the impacts of human and other biotic activity on the quality of the air we breathe. Changes in regional and global climate are also central to this field of study.

The Program. Modern meteorology is a quantitative science that is becoming increasingly computer dependent. In addition to the study of daily weather events, the program deals with fundamental dynamical and physical processes that involve the general circulation of the atmosphere; turbulent mass and energy transfer at the planetary surface as well as within the free atmosphere; the transfer of solar and terrestrial radiation throughout the atmosphere; atmospheric interaction with the biosphere; climate variations; and developments in remote sensing using satellites with modern meteorological instrumentation. In addition, the program has significant expertise in the areas of air quality and its related atmospheric chemistry. As well as providing a broad background in meteorology, the major includes an informal minor area to be chosen from mathematics, computer science, environmental studies, resource management or a physical or biological science.

Internships and Career Alternatives. Atmospheric science students have participated in internships with the California Air Resources Board, various county Air Pollution Control Districts, and the National Weather Service. Numerous career opportunities exist in the federal and state government, as well as research and development in the private sector, and education. Examples of career areas are weather forecasting, agricultural meteorology, air-pollution forecasting and control, wind energy, forest fire, weather modification, hurricane and severe weather forecasting and research, weather satellite meteorology, environmental consulting, and weather and climate research. About half of our graduates continue their education by seeking the M.S. or Ph.D. degree in atmospheric science or related areas.

B.S. Major Requirements:

	UNITS
Written Expression. Also counts toward College English Composition Requirement	**3-4**
University Writing Program 101 or one course from 102 or 104 sequences or course selected with adviser's approval	
Preparatory Subject Matter	**59-60**
Plant Sciences 2	4
Chemistry 2A, 2B	10
Computer Science Engineering 30 or course selected with adviser's approval	4
Mathematics 21A, 21B, 21C, 21D, 22A, 22B	22
Atmospheric Science 60	4
Physics 9A, 9B, 9C	12
Statistics 13	3
Depth Subject Matter	**41**
Atmospheric Science 110, 111, 111L, 120, 121A, 121B, 124, 128	28
Internship-Atmospheric Science 192 or 199	2
Two upper division Atmospheric Science courses selected with adviser's approval, not including courses 192 and 199	7

Engineering 6, Atmospheric Science 150, Civil and Environmental Engineering 119A or course selected with adviser's approval. 4

Restricted Electives 15

Coordinated group of courses (minor area) to be chosen with adviser's approval from mathematics, computer science, environmental studies, communication, resource management, or a physical or biological science (at least 10 upper division units)..... 15

Total Units for the Major..... 118-120

Major Adviser. Shu-Hua Chen

Advising Center the major, is located in 1150 Plant and Environmental Sciences Building in Land, Air and Water Resources Teaching Center (530) 752-1603; *lawradvising@ucdavis.edu*.

Note. Alternative options for students who are interested in atmospheric science are to minor in ATM or to major in ESM choosing climate change and air pollution track. However, both the ATM minor and the ESM climate change and air quality track do not meet the Federal civil service requirements for meteorologists.

Minor Program Requirements:

Minor Program. The minor in Atmospheric Science provides a broad treatment of weather and climate, with the option to focus on such topics as climate change, meteorological instrumentation, and satellite remote sensing. Students undertaking the minor should have completed minimum preparatory course work in calculus and physics (Mathematics 16A-16B, Physics 5A or 7A). Some upper division courses in Atmospheric Science have the Mathematics 21 and 22 series and the Physics 9 series as prerequisites.

UNITS

Atmospheric Science..... 20-24

Atmospheric Science 60, 110..... 8
Four courses selected with the approval of the minor program adviser from upper division Atmospheric Science courses (excluding 192 or 199) or Environmental and Resource Sciences 131..... 12-16

Minor Adviser. Shu-Hua Chen

Graduate Study. You can specialize in particular areas of atmospheric science through graduate study and research leading to the M.S. and Ph.D. degrees. For details, see the Atmospheric Science (A Graduate Group), on page 171, and Graduate Studies, on page 109.

Related Courses. See Environmental Science and Policy 150A; Physics 104A, 104B; Environmental and Resource Sciences 131.

Courses in Atmospheric Science (ATM)

Questions pertaining to the following courses should be directed to the instructor or to the Land, Air and Water Resources Teaching Center in 1150 Plant & Environmental Sciences Building (530) 752-1603.

Lower Division Courses

5. Global Climate Change (3)
Lecture—2 hours; discussion—1 hour. Scientific concepts needed to understand climate and climate change. Principles of regional variations in climate. Understanding observed seasonal, decadal and millennial changes. Analysis of the Antarctic ozone hole, El Nino and human-induced global warming. GE credit: SciEng.—II. (II.) Weare

6. Fundamentals of Atmospheric Pollution (3)
Lecture—3 hours. Effects of human emissions on the atmosphere: smog, ozone pollution, and ozone depletion; indoor air pollution; global warming; acid rain. Impacts of these problems on the earth, ecosystems, and humans. Strategies to reduce atmospheric pollution. GE credit: SciEng.—I. (I.) Anastasio

10. Severe and Unusual Weather (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: high school physics. Introduction to physical principles of severe and unusual weather: flood, blizzards, thunderstorms, lightning, tornadoes, and hurricanes. Emphasis on scientific perspective and human context. Not open to students who have received credit for course 100. (Former course 100.) GE credit: SciEng, Wrt.—I, III. (I, III.) Grotjahn, Reck

30. Issues in Atmospheric Science (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: high school physics. Introduction to selected topics in atmospheric science, such as: meteorological aspects of air pollution, use of computer models in weather forecasting, theories of global climate change, impact of satellites on meteorology, and modern meteorological instrumentation. (P/NP grading only.)—II. (II.) Anastasio

60. Atmospheric Physics and Dynamics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A and Physics 5A or 7A. Composition and thermal structure of the atmosphere. Radiation and the heat budget of the earth and its atmosphere. Cloud formation and precipitation processes. The atmosphere in motion, thunderstorms and other severe weather phenomena.—I. (I.) Faloona

92. Atmospheric Science Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

110. Weather Observation and Analysis (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 60. Acquisition, distribution and analysis of meteorological data. Vertical sounding analysis, stability indices, probability of local severe weather, weather map analysis. Use of National Weather Service analyses and forecast products. Laboratory makes use of computer-generated analyses.—III. (III.) Chen

111. Weather Analysis and Prediction (3)
Lecture—3 hours. Prerequisite: courses 110, 121B, 111L (concurrently), knowledge of a programming language. Tools for analyzing observed properties of mid-latitude weather systems. The analysis-forecast system, including various weather forecast models. General structure and properties of mid-latitude weather systems.—II. (II.) Grotjahn

111L. Weather Analysis and Prediction Laboratory (2)
Laboratory—2 hours; Online lecture—4 hours. Prerequisite: course 111 (concurrently). Subjective and objective analysis of weather data. Web-based learning of the analysis-forecast system and various weather forecasting situations. Weather map interpretation and forecast discussions. (P/NP grading only.)—II. (II.) Grotjahn

112. Weather Forecasting Practice (2)
Discussion—2 hours; laboratory—1 hour. Prerequisite: course 110. Formal practice in preparing local weather forecasts. Analysis of current weather conditions and recent model performance. Verification and discussion of prior forecast. Interpretation of current forecast model guidance. Posting of forecast. May be repeated for credit up to three times. (P/NP grading only.)—I. (I.) Grotjahn

115. Hydroclimatology (3)
Lecture—3 hours. Prerequisite: course 60. Examination of climate as the forcing function for the hydrologic system. Emphasis on seasonal variations in the relationship between precipitation and evapotranspiration for meso-scale areas. Watershed modeling of floods and drought for evaluating the effects of climatic fluctuations.—III. (III.)

116. Climate Change (3)
Lecture—3 hours. Prerequisite: course 60. Climate trends and patterns spanning the recent past and the future. Emphasis on natural processes that produce climate variations and human influence on these processes. Evidence of climate change and the role of global climate models in understanding climate variability.—III. (III.) Reck

120. Atmospheric Thermodynamics and Cloud Physics (4)
Lecture—3 hours, extensive problem solving. Prerequisite: Mathematics 21C, Physics 9B, course 60 (may be taken concurrently). Atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, atmospheric stability; cloud nucleation, cloud growth by condensation and collision, cloud models.—I. (I.) Weare

121A. Atmospheric Dynamics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 120, Mathematics 21D, Physics 9B. Fundamental forces of atmospheric flow; noninertial reference frames; development of the equations of motion for rotating stratified atmospheres; isobaric and natural coordinate systems; geostrophic flow; thermal wind; circulation and vorticity.—II. (II.) Nathan

121B. Atmospheric Dynamics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 121A. Dynamics of fluid motion in geophysical systems; quasi-geostrophic theory; fundamentals of wave propagation in fluids; Rossby waves; gravity waves; fundamentals of hydrodynamic instability; two-level model; baroclinic instability and cyclogenesis.—III. (III.) Chen

124. Meteorological Instruments and Observations (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 60; Physics 5C. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included.—I. (I.) Paw U

128. Radiation and Satellite Meteorology (4)
Lecture/discussion—3 hours; discussion/laboratory—2 hours. Prerequisite: course 60, Physics 9B, Mathematics 22B, 21D. Concepts of atmospheric radiation and the use of satellites in remote sensing. Emphasis on the modification of solar and infrared radiation by the atmosphere. Estimation from satellite data of atmospheric variables such as temperatures and cloudiness.—II. (II.) Reck

133. Biometeorology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in a biological discipline and Mathematics 16B or consent of instructor. Atmospheric and biological interactions. Physical and biological basis for water vapor, carbon dioxide and energy exchanges with the atmosphere associated with plants and animals, including humans. Microclimate of plant canopies and microclimatic modification such as frost protection and windbreaks.—II. (II.) Paw U, Snyder

149. Air Pollution (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21D, 22B, Chemistry 2B, Atmospheric Science 121A or Engineering 103. Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (Same course as Civil and Environmental Engineering 149.)—I. (I.) Cappa

150. Introduction to Computer Methods in Physical Sciences (4)
Lecture—3 hour; lecture/discussion—2 hours. Prerequisite: Mathematics 22B, Physics 9B, and a computer programming course such as Engineering Computer Science 30. Additional courses in fluid dynamics (course 121A or Engineering 103) and in Fourier transforms (Mathematics 118C or Physics 104A) are helpful, but not required. Computational techniques used in physical sciences. Integral and

differential equation numerical solution: mainly finite differencing and spectral (Fourier transform) methods. Time series applications (time-permitting). Specific applications drawn from meteorology. Accelerated introduction to FORTRAN including programming assignments. Enrollment limited to 12, preference to Atmospheric Science majors. Offered in alternate years. (P/NP grading only.)—I. Grotjahn

158. Boundary-Layer Meteorology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Growth, development and structure of the atmospheric layer directly influenced by the underlying surface and extending to a maximum of about two kilometers under convective conditions. Turbulent diffusion in the boundary layer. The microclimate at and near the ground surface.—III. (III.) Faloona

160. Introduction to Atmospheric Chemistry (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 2B. Quantitative examination of current local, regional and global problems in atmospheric chemistry (including photochemical smog, acid deposition, climate change, and stratospheric ozone depletion) using fundamental concepts from chemistry. Basic chemical modeling of atmospheric reaction systems.—II. (II.) Anastasio

192. Atmospheric Science Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Internship off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: three upper division units in Atmospheric Science. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: three upper division units in Atmospheric Science and at least an overall B average. (P/NP grading only.)

Graduate Courses

215. Advanced Hydroclimatology (3)
Lecture—3 hours. Prerequisite: course 115. Theoretical and applied aspects of energy and mass fluxes linking the earth's surface, atmosphere, and hydrologic system. Emphasis on regional scale analysis and modeling, spatial data representation, and climate change influences on precipitation and its hydroclimatic expression. Offered in alternate years.—(III.)

221. Advanced Atmospheric Dynamics (3)
Lecture—3 hours. Prerequisite: course 121B. Conditions for instability in stratified atmospheres; baroclinic instability; forced topographic Rossby Waves; wave-mean flow interaction theory; tropical dynamics; stratospheric dynamics. Offered in alternate years.—(II.) Nathan

223. Advanced Boundary-Layer Meteorology (3)
Lecture—3 hours. Prerequisite: course 230. Characteristics of the atmospheric boundary layer under convective and nocturnal conditions. Heat budget at the surface and boundary layer forcing. Similarity theory and scaling of the boundary layer. Measurement and simulation techniques. Offered in alternate years.—(III.) Faloona

230. Atmospheric Turbulence (3)
Lecture—3 hours. Prerequisite:+ course 121B or 158. Dynamics and energetics of turbulence in the atmosphere including vorticity dynamics. Statistical description of turbulence; Eulerian and Lagrangian scales, spectral analysis, conditional sampling techniques. Turbulent diffusion; the closure problem, gradient-diffusion and second-order methods. Offered in alternate years.—II. Paw U

231. Advanced Air Pollution Meteorology (3)
Lecture—3 hours. Prerequisites: Course 149A, 160 and one course in fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of chemical transformation, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems. Offered in alternate years.—(I.)

233. Advanced Biometeorology (3)
Lecture/discussion—3 hours. Prerequisite: course 133 or consent of instructor. Current topics in biometeorology. Physical and biological basis for water vapor, other gases, and energy exchange with the atmosphere. Topics include modeling and measuring turbulent transport from plant canopies, surface temperatures and energy budgets, bio-aerosol physics and aerobiology. Offered in alternate years.—(II.) Paw U

240. General Circulation of the Atmosphere (4)
Lecture/discussion—4 hours. Prerequisite: course 121B. Large-scale, observed atmospheric properties. Radiation, momentum, and energy balances derived and compared with observations. Lectures and homework synthesize observations and theories, then apply them to understand the large-scale circulations. Offered in alternate years—I. Grotjahn

241. Climate Dynamics (3)
Lecture/discussion—3 hours. Prerequisite: course 121B. Dynamics of large-scale climatic variations over time periods from weeks to centuries. Description of the appropriate methods of analysis of atmospheric and oceanic observations. Conservation of mass, energy and momentum. Introduction to the range of climate simulations.Offered in alternate years.—I. (I.) Weare

250. Meso-Scale Meteorology (3)
Lecture—3 hours. Prerequisite: graduate standing, course 150, a course in partial differential equations; or consent of instructor. The study of weather phenomena with horizontal spatial dimensions between 2.5 and 2500 kilometers. Methods of observational study and numerical modeling of the structure and temporal behavior of these weather systems. Offered in alternate years.—I. Chen

255. Numerical Modeling of the Atmosphere (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 121B and Engineering 5; course 150 recommended. Principles of numerical modeling of the dynamic, thermodynamic and physical processes of the atmosphere. Hands-on experiments on model development using the shallow water equations and the primitive equations. Operational forecast models. Offered in alternate years.—(I.) Chen

260. Atmospheric Chemistry (3)
Lecture—3 hours. Prerequisite: course 160. Chemistry and photochemistry in tropospheric condensed phases (fog, cloud, and rain drops and aerosol particles). Gas-drop and gas-particle partitioning of compounds and effects of reactions in condensed phases on the fates and transformations of tropospheric chemical species. Offered in alternate years.—III. Anastasio

270A-G. Topics in Atmospheric Science (1-3)
Discussion—1-3 hours. Applications and concepts in (A) Meteorological Statistics; (B) Computer Modeling of the Atmosphere; (C) Design of Experiments and Field Studies in Meteorology; (D) Solar and Infrared Radiation in the Atmosphere; (E) Aerosol and Cloud Physics; (F) Atmospheric Chemistry; (G) General Meteorology.—I, II, III. (I, II, III.)

280A. Air Quality Policy in the Real World (4)
Project. Prerequisite: consent of instructor; Atmospheric Science 149 or Engineering: Civil and Environmental 149, and Engineering: Civil and Environmental 242 or equivalent. In-depth investigation of an air quality problem with a team and mentor from government or industry. Science, engineering and policy will be involved. Findings will be presented orally and in writing. Not offered every year. (Deferred grading only, pending completion of sequence.)—II, III. (II, III.)

280B. Air Quality Policy in the Real World (4)
Project. Prerequisite: course 280A; consent of instructor. In-depth investigation of an air quality problem with a team and mentor from government or industry. Science, engineering and policy will be involved. Findings will be presented orally and in writing. (Deferred grading only, pending completion of sequence.) Not offered every year.—II, III. (II, III.)

290. Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing in Atmospheric Science or related field. Current developments in selected areas of atmospheric research. Topics will vary according to student and faculty interests. (S/U grading only.)—I, II, III. (I, II, III.)

291A-F. Research Conference in Atmospheric Science (1-3)
Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Review and discussion of current literature and research in: (A) Air Quality Meteorology; (B) Biometeorology; (C) Boundary Layer Meteorology; (D) Climate Dynamics; (E) General Meteorology; (F) Atmospheric Chemistry. May be repeated up to a total of 6 units per segment. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299. Research (1-12)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Atmospheric Science (A Graduate Group)

Bryan C. Weare, Ph.D., Chairperson of the Group
(530) 752-3445

Group Office. 1152 Plant and Environmental Sciences Building (530) 752-1669;
http://atm.ucdavis.edu

Faculty

Cort Anastasio, Ph.D., Professor
Christopher Cappa, Ph.D., Assistant Professor *(Civil and Environmental Engineering)*
Shu-Hua Chen, Ph.D., Associate Professor
Ian Faloona, Ph.D., Assistant Professor
Richard Grotjahn, Ph.D., Professor
Levent Kavvas, Ph.D., Professor *(Civil and Environmental Engineering)*
Michael J. Kleeman, Ph.D., Professor *(Civil and Environmental Engineering)*
John Largier, Ph.D., Professor *(Environmental Science and Policy)*
Terrence R. Nathan, Ph.D., Professor
Debbie Niemeier, Ph.D., Professor *(Civil and Environmental Engineering)*
Kyaw Tha Paw U, Ph.D., Professor
Ruth Reck, Ph. D., Professor
Susan Ustin, Ph.D., Professor
Bryan Weare, Ph.D., Professor
Anthony Wexler, Ph. D., Professor *(Mechanical and Aerospace Engineering; Civil and Environmental Engineering)*
Bruce White, Ph.D., Professor *(Mechanical and Aerospace Engineering)*
Zhang, Qi, Assistant Professor *(Environmental Toxicology)*

Emeriti Faculty

Thomas A. Cahill, Ph.D., Professor Emeritus
Robert Flocchini, Ph.D., Professor Emeritus *(Crocker Nuclear Laboratory)*

Affiliated Faculty

Lowell Ashbaugh, Ph.D., Associate Researcher
(Crocker Nuclear Laboratory)
Steven S. Cliff, Ph.D., Assistant Researcher
(Applied Science)
Ann Dillner, Ph.D., Assistant Researcher
(Crocker Nuclear laboratory)
Richard L. Snyder, Ph.D., Biometeorology Specialist

Graduate Study. The Graduate Group in Atmospheric Science offers both the M.S. and Ph.D. degree programs. A student may place emphasis on graduate work in one or more of the following fields: air quality meteorology, atmospheric chemistry, biometeorology, micrometeorology, numerical weather prediction, remote sensing, climate dynamics, large scale dynamics, and meso-scale meteorology. The diverse and extensive backgrounds of the faculty allow opportunities for interdisciplinary training and research.

Preparation. The Group encourages applications from all interested students with backgrounds in the physical or natural sciences. Basic qualifications for students entering the Atmospheric Science graduate program include mathematics to the level of vector calculus and differential equations, and one year of college-level physics. Flexibility may be allowed for students with high academic potential, but it is expected that deficiencies in preparatory material and in key undergraduate atmospheric science courses be completed within the first year of graduate study.

Graduate Adviser. C. Anastasio *(Land, Air and Water Resources)* (530) 754-6095

Graduate Admissions Officer. Kyaw Tha Paw U (530) 752-8172

Avian Medicine

See Medicine and Epidemiology (VME), on page 522.

Avian Sciences

(College of Agricultural and Environmental Sciences)

Faculty. See under Animal Science, on page 150.

Master Adviser. A. J. King

Advising Center for the major, minor and course offerings (including peer advising), is located in the Animal Science Advising Center in 1202 Meyer Hall (530) 754-7915; *http://asac.ucdavis.edu/*

The Major Program

Avian Sciences is the study of birds and the ways in which they relate to and are useful to humans. The major combines the study of avian wildlife and their environments, production and marketing of domestic birds and eggs, caged exotic bird management, and basic and applied laboratory research on birds with a broad introduction to biological science.

The Program. The flexibility of the program and the close personal interaction between students, faculty, and specialists in the field give students a large role in selecting and designing their own course work. Students may specialize in a bachelor's program that qualifies them for a particular career or they may choose a program to meet other broader intellectual and cultural interests.

Internships and Career Alternatives. Independent study, undergraduate research, and internships are emphasized in the Avian Sciences program. Birds for laboratory or special study are housed within the main building as well as at the research farm and the experimental aviary. An Avian Sciences major has a variety of career options: health-oriented research, teaching biology, game bird production, domestic and foreign agricultural extension and advisory services, governmental agencies, or the domestic or exotic bird industries. A recent survey has shown that the majority of Avian Sciences graduates enter graduate school or are employed by the domestic bird industry. The remainder of the graduates were evenly distributed in the categories of professional schools, avian biology agencies, educational fields, and individual jobs indirectly associated with birds.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 61-73

At least 3 units from Avian Sciences 11, 13, 14L, 15L, 16L 3-5
Biological Sciences 1A, 1B, 1C or 2A, 2B, 2C 14-15
Chemistry 2A, 2B, 2C, 8A, 8B 21
Plant Sciences 21 or Engineering Computer Science 15 3-4
Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C 9-12
Physics 1A-1B or 7A-7B-7C 6-12
One course from Statistics 13, 100, or Plant Sciences 120 4

Depth Subject Matter 26

Animal Biology 102 and 103 or Biological Sciences 102, 103 and Nutrition 123, 123L 10
Biological Sciences 101 4
Avian Sciences 103, 150 4
Neurobiology, Physiology, and Behavior 101 5
Laboratory units in above listed subjects.... 3
(Recommended courses include Animal Genetics 101; Animal Science 136, 137; Avian Sciences 160; Molecular and Cellular Biology 120L, 150L, 160L; or Neurobiology, Physiology, and Behavior 101L.)

Restricted Electives 28

Specialized courses related to avian species to supplement or expand depth subject matter courses. Courses must be approved by an adviser.

Total Units for the Major 115-127

Minor Program Requirements:

UNITS

Avian Sciences 18

Choose one from Avian Sciences 11, 13, 14L, 15L, 16L 2-3
Choose remaining units from Avian Sciences 100, 103, 115, 121, 123, 149, 150, 160; Animal Science 143; Neurobiology, Physiology, and Behavior 117; Wildlife, Fish, and Conservation Biology 111, 136 15-16

Graduate Study. Further training is available through graduate or professional programs in animal physiology, genetics, nutrition, or veterinary medicine. The M.S. degree is offered in Avian Sciences. For details see under Avian Sciences (A Graduate Group), on page 173. See also Graduate Studies, on page 109.

Related Courses. See Agricultural and Resource Economics 130; Animal Science 143; Food Science and Technology 120, 120L, 121; Molecular and Cellular Biology 150, 150L; Nutrition 123, 123L.

Courses in Avian Sciences (AVS)

Lower Division Courses

11. Introduction to Poultry Science (3)
Lecture—3 hours. The mosaic of events that have tied poultry science to other scientific disciplines and poultry to humans. Poultry science techniques and production methods from the time of domestication to the present. One field trip required. GE credit: SciEng, Wrt.

13. Birds, Humans and the Environment (3)
Lecture—2 hours; discussion—1 hour. Interrelationships of the worlds of birds and humans. Lectures, discussions, field trips and projects focus on ecology, avian evolution, physiology, reproduction, flight, behavior, folklore, identification, ecotoxicology and conservation. Current environmental issues are emphasized. Half-day field trip. GE credit: SciEng, Wrt.—I. (I.) King

14L. Management of Captive Birds (2)
Fieldwork—3 hours; lecture/discussion—1 hour. Prerequisite: consent of instructor. One weekly discussion and field trip to study practical captive management (housing, feeding, equipment, marketing, diseases). Visit facilities rearing birds such as commercial parrots, hobbyist exotics, ostrich, raptors, waterfowl, game birds, poultry and pigeons.

15L. Captive Raptor Management (2)
Laboratory—3 hours; independent study—3 hours; one field trip. Hands-on experience handling birds of prey. Students are taught all of the skills required to handle and care for raptors, including their husbandry, biology, habitat requirements, cage design, veterinary care, rehabilitation methods, research potential and long-term care requirements.—I. (I.)

16LA-16LB-16LC. Raptor Migration and Population Fluctuations (2-2-2)
Fieldwork—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: consent of instructor. Identify raptors; study effects of weather, crops, agricultural practices on fluctuations in raptor species and numbers. Familiarize with literature; design a project; survey study sites; collect, computerize, analyze data; compare with previous years. Species, observations, emphasis are different each quarter.—III. (III.)

92. Internship in the Avian Sciences (1-12)
Internship—3-36 hours. Prerequisite: sophomore standing preferred; consent of instructor. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval form essential. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Avian Biology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B. Survey of avian natural history and study of the diversity, functional morphology, behavior, ecology and evolution of birds.

103. Avian Development and Genetics (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A and 1B. Unique features of avian development and genetics. Development topics: gametogenesis, fertilization, pre- and post-oviposital development, morphogenesis, sex differentiation, specialized organ systems, incubation, hatching. Genetic topics: genome organization, inheritance, sex determination, avian models. Laboratory exercises: embryology, genetics, model systems.

115. Raptor Biology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A or the equivalent. Study of birds of prey: classification, distribution, habits and habitats, migration, unique anatomical and physiological adaptations, natural and captive breeding, health and diseases, environmental concerns, conservation, legal considerations, rehabilitation, and falconry. Includes two Saturday field trips.—II. (II.)

121. Avian Reproduction (2)
Lecture—2 hours. Prerequisite: Biological Sciences 1A, 1B. Breeding cycles and reproductive strategies, egg and sperm formation, incubation, sexual development, imprinting, hormonal control of reproductive behavior and song. Species coverage includes wild and companion birds. Course has a physiological orientation. Offered in alternate years.—II. Millam

123. Management of Birds (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B. Captive propagation of birds, including reproduction, genetic management, health, feeding, artificial incubation, artificial insemination, and related legal aspects, including trade and smuggling. Emphasis on exotic species and the role of captive propagation in conservation. Offered in alternate years.—(II.) Millam

149. Egg Production Management (2)
Lecture—2 hours. Prerequisite: course 11 or the equivalent, or consent of instructor. Management of commercial table egg flocks as related to environment, nutrition, disease control, economics, housing, equipment, egg processing and raising replacement pullets. One Saturday field trip required. Offered in alternate years.—(III.)

150. Nutrition of Birds (1)
Lecture—1 hour. Prerequisite: Animal Biology 103 (may be taken concurrently). Principles of nutrition specific to avian species, including feedstuffs, feed additives, nutrient metabolism, energy systems, and nutritional support of egg production and growth. Use of computers for feed formulation to support production. Offered in alternate years.—(III.) Klasing

160. Designing and Performing Experiments in Avian Sciences (2)
Laboratory—6 hours. Prerequisite: course 100 or Wildlife, Fish, and Conservation Biology 111 or Evolution and Ecology 137 or consent of instructor. Experiments in current problems in avian biology. Introduction to experimental design. Students choose a project, design a protocol, perform an experiment and report their findings. May be repeated for credit with consent of instructor.—I, II, III. (I, II, III.)

170. Advanced Avian Biology (4)
Lecture/discussion—3 hours; project—1 hour. Prerequisite: course 100 or Evolution and Ecology 137 or Wildlife, Fish, and Conservation Biology 111. Ecology, behavior, functional morphology and life-history evolution of birds. Emphasis on the importance of body size as a principle determinant of most aspects of avian performance from lifespan to reproduction and species abundance. Analytical synthesis and critical thought emphasized. Offered in alternate years.

190. Seminar in Avian Sciences (1)
Seminar—1 hour. Prerequisite: upper division standing in Avian Sciences and consent of instructor. May be repeated three times for credit. (P/NP grading only.)—I, III. (I, III.)

192. Internship in Avian Sciences (1-12)
Internship—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Internship on and off campus in poultry, game birds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval form essential. (P/NP grading only.)

195. Topics in Current Research (1-3)
Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Discussion of topics of current interest in avian sciences. May be repeated three times for credit.—I, II, III. (I, II, III.)

197T. Tutoring in Avian Sciences (1-3)
Tutorial—1-3 hours. Prerequisite: Avian Sciences or related major, advanced standing, consent of instructor. Tutoring of students in lower division avian sciences courses; weekly conference with instructors in charge of courses; written critiques of teaching procedures. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

290. Seminar (1)
Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology.—I, III. (I, III.)

290C. Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Major professors lead research discussions with their graduate students. Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion. (S/U grading only.)—I, II, III. (I, II, III.)

297T. Supervised Teaching in Avian Sciences (1-4)
Tutoring—1-4 hours. Prerequisite: graduate standing and consent of instructor. Tutoring of students in lower, upper division, and graduate courses in Avian Sciences; weekly conference with instructor in charge of course; written critiques of teaching methods in lectures and laboratories. (S/U grading only.)

298. Group Study (1-5)
Prerequisite: consent of instructor.

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Avian Sciences (A Graduate Group)

John M. Eadie, Ph.D., Chairperson of the Group

Group Office. 1202B Meyer Hall
(530) 752-2382; *http://aviansciences.ucdavis.edu*

Faculty

Francine A. Bradley, Ph.D., Specialist in Cooperative Extension and Lecturer *(Animal Science)*
C. Christopher Calvert, Ph.D., Professor *(Animal Science)*
Carol J. Cardona, D.V.M., Ph.D., ACPV, Associate Veterinarian; Associate Extension Specialist *(Population Health and Reproduction, School of Veterinary Medicine)*
Thomas P. Coombs-Hahn, Ph.D., Associate Professor *(Neurobiology, Physiology, and Behavior)*
Mary E. Delany, Ph.D., Professor *(Animal Science)*
John M. Eadie, Ph.D., Professor *(Wildlife, Fish, and Conservation Biology, Animal Science)*
Holly B Ernest, D.V.M., Ph.D., Assistant Professor in Residence: Wildlife Geneticist *(Veterinary Genetics Laboratory and Population Health and Reproduction, School of Veterinary Medicine)*
Michelle Hawkins, V.M.D., ABVP, Assistant Professor *(Medicine and Epidemiology, School of Veterinary Medicine)*
Annie J. King, Ph.D., Professor *(Animal Science)*
Kirk C. Klasing, Ph.D., Professor *(Animal Science)*
Jenella E. Loye, Ph.D., Research Associate *(Entomology)*
Joy A. Mench, Ph.D., Professor *(Animal Science)*
James R. Millam, Ph.D., Professor *(Animal Science)*
Lisa A. Tell, D.V.M., Professor *(Medicine and Epidemiology, School of Veterinary Medicine)*
Barry W. Wilson, Ph.D., Professor *(Animal Science, Environmental Toxicology)*

Emeriti Faculty

Ursula K. Abbott, Ph.D., Professor Emerita
Hans Abplanalp, Ph.D., Professor Emeritus
Dan Anderson, Ph.D., Professor
Ralph A. Ernst, Ph.D., Specialist Emeritus
Peter Marler, Ph.D., Professor Emeritus

Graduate Study. The Graduate Group in Avian Sciences offers the M.S. degree program to students who wish to pursue specialized advanced work on avian species. Specializations students may choose include behavior, nutrition, physiology, reproduction, pathology, immunology, toxicology, food chemistry, management, ecology, genetics, comparative incubation, environmental physiology, and cellular and developmental studies using wild and domestic birds as experimental animals. Both master's degree plans, thesis or comprehensive examination, are available.

Preparation. Applicants should have undergraduate preparation in a field appropriate to the course of study selected, including courses in most of the following subjects: general biology, general and organic chemistry, biochemistry, avian biology, genetics, nutrition, physiology, and statistics.

Graduate Adviser. Consult program office.

Biochemistry and Molecular Biology

See Molecular and Cellular Biology, on page 417; Biochemistry and Molecular Biology (A Graduate Group), on page 173.

Biochemistry and Molecular Biology (A Graduate Group)

JoAnne Engebrecht, Ph.D., Chairperson of the Group

Group Office. 306 Life Sciences;
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http://www-ggc.ucdavis.edu/ggc/bmb

Faculty

Steffen Abel, Ph.D., Associate Professor *(Plant Sciences)*
James Ames, Ph.D., Associate Professor *(Chemistry)*
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Enoch Baldwin, Ph.D., Associate Professor *(Molecular and Cellular Biology)*
Kenneth A Beck, Ph.D., Associate Professor *(Cell Biology and Human Anatomy)*
Diane Beckles, Ph.D., Assistant Professor *(Plant Sciences)*
Alan Bennett, Ph.D., Professor *(Plant Sciences)*
Charles Bevins, Ph.D., Professor *(Medical Microbiology and Immunology)*
Linda F. Bisson, Ph.D., Professor *(Viticulture and Enology)*
Eduardo Blumwald, Ph.D., Professor *(Plant Sciences)*
Sue Bodine, Ph.D., Professor *(Neurobiology, Physiology, and Behavior)*
R. David Britt, Ph.D., Professor *(Chemistry)*
Sean Burgess, Ph.D., Associate Professor *(Molecular and Cellular Biology)*
Marie E. Burns, Ph.D., Associate Professor *(Center for Neuroscience)*
Judy Callis, Ph.D., Professor *(Molecular and Cellular Biology) Academic Senate Distinguished Teaching Award*
Kermit L. Carraway, Ph.D. Associate Professor *(Cancer Center UCDMC)*
Simon Chan, Ph.D., Assistant Professor *(Plant Biology)*
Frederic Chedin, Ph.D., Assistant Professor *(Molecular and Cellular Biology)*
Hongwu Chen, Ph.D., Associate Professor *(Cancer Center UCDMC)*
Tsung-Yu Chen Ph.D., Associate Professor *(Center for Neuroscience)*

Xinbin Chen, Ph.D., Director
(Surgical and Radiological Science)
Hwai-Jong Cheng, Ph.D., Associate Professor
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Peggy Farnham, Ph.D., Professor
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(Genome Center and Bioinformatics)
Andrew Fisher, Ph.D., Associate Professor
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Paramita Ghosh, Ph.D., Assistant Adjunct Professor
(Urology)
Cecilia Giulivi, Ph.D., Professor
(Molecular Biosciences)
Tzipora Goldkorn, Ph.D., Professor
(Internal Medicine)
Qizhi Gong, Ph.D., Assistant Professor
(Cell Biology and Human Anatomy)
Paul Hagerman, Ph.D., Professor
(Biochemistry and Molecular Medicine)
Nobuko Hagiwara, Ph.D., Assistant Professor
(Internal Medicine: Cardiovascular Medicine)
Fawaz Haj, Ph.D., Assistant Professor *(Nutrition)*
Bruce D. Hammock, Ph.D., Professor *(Entomology)*
Academic Senate Distinguished Teaching Award
John H. Harada, Ph.D., Professor *(Plant Biology)*
Academic Senate Distinguished Teaching Award
Stacey L. Harmer, Ph.D., Assistant Professor
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Jerry L. Hedrick, Ph.D., Professor *(Animal Science)*
Distinguished Graduate Mentoring Award)
Wolf-Dietrich Heyer, Ph.D., Professor *(Microbiology)*
Neil Hunter, Ph.D., Assistant Professor
(Microbiology)
Kentaro Inoue, Ph.D., Assistant Professor
(Plant Sciences)
Clarence I. Kado, Ph.D., Professor
(Plant Pathology)
Ken Kaplan, Ph.D., Associate Professor
(Molecular and Cellular Biology)
Daniel Kliebenstein, Ph.D., Assistant Professor
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Ian Korf, Ph.D., Assistant Professor
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(Center for Neuroscience)
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(Physiology and Membrane Biology)
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Sharman D. O'Neill, Ph.D., Professor
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Rebecca Parales, Ph.D., Associate Professor
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(Human Physiology and Membrane Biology)
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(Molecular Biosciences)
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Pamela C. Ronald, Ph.D., Professor
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(Molecular and Cellular Biology)
Lesilee Rose, Ph.D., Associate Professor
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Dewey D. Ryu, Ph.D., Professor
(Biochemical Engineering)
Earl Sawai, Ph.D., Associate Adjunct Professor
(Pathology)
Jonathan M. Scholey, Ph.D., Professor
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David Segal, Ph.D., Assistant Professor
(Medical Pharmacology and Toxicology)
Irwin H. Segel, Ph.D., Professor
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Kazuhiro Shiozaki, Ph.D., Associate Professor
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Mitchell Singer, Ph.D., Professor
(Microbiology)
Henning Stahlberg, Ph.D., Associate Professor
(Molecular and Cellular Biology)
Dan Starr, Ph.D., Assistant Professor
(Molecular and Cellular Biology)
Valley J. Stewart, Ph.D., Professor *(Microbiology)*
Colleen Sweeney, Ph.D., Associate Professor
(Cancer Center UCDMC)
Fern Tablin, Ph.D., Professor
(Anatomy, Physiology and Cell Biology)
Yoshikazu Takada, Ph.D., Professor *(Dermatology)*
Steven M. Theg, Ph.D., Professor *(Plant Biology)*
James Trimmer, Ph.D., Professor
(Neurobiology, Physiology, and Behavior)
Andrew T. Vaughan, Ph.D. Professor
(Radiation Oncology)
Ana Vazquez, Ph.D., Assistant Adjunct Professor
(Otolaryngology)
John V. Voss, Ph.D., Associate Professor
(Biochemistry and Molecular Medicine)
P. Richard Vulliet, Ph.D., D.V.M., Professor
(Molecular Biosciences)
Robert H. Weiss, M.D., Professor
(Internal Medicine, Nephrology)
David Wilson, Ph.D., Professor
(Molecular and Cellular Biology)
Matthew Wood, Ph.D., Assistant Professor
(Environmental Toxicology)
Michael Wright, Ph.D., Assistant Professor
(Medical Pharmacology and Toxicology)
Reen Wu, Ph.D., Professor *(Internal Medicine)*
John I. Yoder, Ph.D., Professor *(Plant Sciences)*
Yohei Yokobayashi, Ph.D., Assistant Professor
(Biomedical Engineering)
Glenn Young, Ph.D., Professor
(Food Science and Technology)
Vincent A. Ziboh, Ph.D., Professor *(Dermatology)*
Karen Zito, Ph.D., Assistant Professor
(Neurobiology, Physiology, and Behavior)

Graduate Study. The Graduate Group in Biochemistry and Molecular Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. Strong preference is given to Ph.D. applicants. Graduate work involves a broad overview of biochemistry and molecular biology in addition to specialization in one or more areas. Examples of areas of emphasis include gene expression, molecular basis of development, protein structure, molecular virology, protein synthesis, enzymology, signal transduction, membrane transport and structural biology. For more information contact the chairperson of the group.

Graduate Advisers. R. Fairclough *(Neurology)*, *T. Powers (Molecular and Cellular Biology)*, L. Rose *(Molecular and Cellular Biology)*, M. Singer *(Microbiology)*

Courses in Biochemistry and Molecular Biology (BMB)

Graduate Courses

290. Seminar (1)
Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)—I, II, III. (I, II, III.)

299. Research (1-12)
(S/U grading only.)

Biological Chemistry

See Medicine, School of, on page 380.

Biological and Agricultural Engineering

(College of Agricultural and Environmental Sciences)

Michael J. Delwiche, Ph.D., Chairperson of the Department

Department Office. 2030 Bainer Hall; (530) 752-0102; http://bae.engineering.ucdavis.edu

Faculty

Michael J. Delwiche, Ph.D., Professor
Julia Fan, Ph.D., Assistant Professor
Fadi A. Fathallah, Ph.D., Professor
D. Ken Giles, Ph.D., Professor
Mark E. Grismer, Ph.D., Professor *(Land, Air and Water Resources)*
Bruce R. Hartsough, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Professor
Tina Jeoh, Ph.D., Assistant Professor
John M. Krochta, Ph.D., Professor *(Food Science and Technology)*
Kathryn McCarthy, Ph.D., Professor *(Food Science and Technology)*
Michael J. McCarthy, Ph.D., Professor *(Food Science and Technology)*
Nitin Nitin, Ph.D., Assistant Professor *(Food Science and Technology)*
Ning Pan, Ph.D., Professor *(Textiles and Clothing)*
Raul H. Piedrahita, Ph.D., Professor
Richard E. Plant, Ph.D., Professor *(Plant Sciences)*
Uriel A. Rosa, Ph.D., Assistant Professor
R. Paul Singh, Ph.D., Professor
David C. Slaughter, Ph.D., Professor
Shrinivasa K. Upadhyaya, Ph.D., Professor
Jean S. VanderGheynst, Ph.D., Professor
Wesley W. Wallender, Ph.D., Professor *(Land, Air and Water Resources)*
Ruihong Zhang, Ph.D., Professor

Emeriti Faculty

Norman B. Akesson, M.S., Professor Emeritus
Robert H. Burgy, M.S., Professor Emeritus
William J. Chancellor, Ph.D., Professor Emeritus
Pictiaw (Paul) Chen, Ph.D., Professor Emeritus
Roger E. Garrett, Ph.D., Professor Emeritus
John R. Goss, M.S., Professor Emeritus
David J. Hills, Ph.D., Professor Emeritus
Miguel A. Mariño, Ph.D., Professor Emeritus
R. Larry Merson, Ph.D., Professor Emeritus
John A. Miles, Ph.D., Professor Emeritus
Stanton R. Morrison, Ph.D., Professor Emeritus
James W. Rumsey, M.S., Senior Lecturer Emeritus
Thomas R. Rumsey, Ph.D., Professor Emeritus
Verne H. Scott, Ph.D., Professor Emeritus
Henry E. Studer, M.S., Professor Emeritus
Wesley E. Yates, M.S., Professor Emeritus

Affiliated Faculty

Daniel Downey, Ph.D., Assistant Research Engineer
Dennis R. Heldman, Ph.D., Adjunct Professor
Zhongli Pan, Ph.D., Associate Adjunct Professor
Herbert B. Scher, Ph.D., Research Engineer
James F. Thompson, M.S., Specialist in Cooperative Extension

Major Programs and Graduate Study. For the Bachelor of Science program, see the major in Engineering: Biological and Agricultural, on page 238; for graduate study, see also Graduate Studies, on page 109.

Minor Programs. The Department of Biological and Agricultural Engineering offers two minors through the College of Agricultural and Environmental Sciences: Geographic Information Systems and Precision Agriculture.

The minor in Geographic Information Systems is open to all majors, including those in engineering. This minor is for students interested in information processing of spatial data related to remote sensing for geographical and environmental planning and related areas.

The minor in Precision Agriculture is open to all majors, including those in engineering, and acquaints students with recent developments and their applications to agriculture, in geographic information systems, global positioning systems, and variable rate technologies.

Courses. Courses are listed under Applied Biological Systems Technology, and Engineering: Biological and Agricultural *(Biological Systems Engineering)*.

Biological Sciences

(College of Biological Sciences)

College of Biological Sciences Dean's Office. 202 Life Sciences
(530) 752-0410; http://www.biosci.ucdavis.edu

Faculty

The Biological Science major and the Bodega Marine Laboratory Spring Quarter Program are offered jointly by the departments of the college. The faculty in the college are members of the Departments of Evolution and Ecology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; Plant Biology. See each department for a list of their faculty.

The Biological Sciences Major

(Departments of Evolution and Ecology; Microbiology; Molecular and Cellular Biology; Neurobiology, Physiology, and Behavior; and Plant Biology)

The Program. The Biological Sciences major is broad in concept, spanning the numerous core disciplines of biology. The Bachelor of Science program includes mathematics, general and organic chemistry, physics, and biology. While emphasizing breadth, the B.S. degree program also features an area of emphasis requirement that provides concentrated attention on one facet of biology at the upper division level. Each area of emphasis coincides with one of the departments of the college. The Bachelor of Arts program emphasizes biological diversity, evolution, and ecology, all built on a foundation of general and organic chemistry, physics and biology. Research and internships are encouraged in both programs.

Career Alternatives. Both degree programs prepare students for admission to graduate schools or professional schools, leading to either a variety of professional health careers or further study in basic and applied areas of biology. They provide suitable preparation for careers in teaching, biological and biotechnological research with various governmental agencies or private companies, government regulatory agencies, environmental consulting, biological illustration and writing, pharmaceutical sales, biological/environmental law, and biomedical engineering.

The A.B. degree program is also appropriate for students interested in teaching biology at the secondary school level and for careers that bear on the ecological problems that require the development of public policy.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter.....39-52
- Biological Sciences 2A-2B-2C..... 14
- Chemistry 2A-2B..... 10
- Chemistry 8A-8B or 118A-118B-118C 6-12
- Physics 1A-1B or 7A-7B-7C 6-12
- Statistics 13, 32, 100, or 102.....3-4

Recommended: Chemistry 2C and Mathematics*17A-17B.
*Mathematics 16A-16B accepted to fulfill this recommendation only for transfer students admitted prior to fall 2013.

Depth Subject Matter 38-42
- Biological Sciences 101 4
- Biological Sciences 102 or 105 3
- *Evolution:* One from Evolution and Ecology 100, 140; Geology 107; Plant Biology 116 3-5
- *Ecology:* One from Environmental Science and Policy 100; Evolution and Ecology 101, 117; Plant Biology 117, 147 4
- *Philosophy of Biological Science:* One from Nature and Culture 100, 120, 140; Philosophy 108; Science and Technology Studies 130A, 130B, 131; Veterinary Medicine 170 4
- *Physiology:* One from Environmental Horticulture 102; Entomology 101, 102; Neurobiology, Physiology, and Behavior 101; Plant Biology 111, 112 3-5
- One course each in animal, microbial and plant diversity.....8-17
- *Animal Diversity:* Entomology 100, 107, 109; Evolution and Ecology 105, 112 and 112L, 134; Nematology 110; Wildlife, Fish, and Conservation Biology 110, 111, 120.
- *Microbial Diversity:* Microbiology 101, 162; Pathology, Microbiology, and Immunology 127, 128; Plant Biology 118, 148; Plant Pathology 148; Soil Science 111.
- *Plant Diversity:* Evolution and Ecology 108, 119, 140; Plant Biology 102, 108, 116, 119, 147.
- Additional upper division course work in biological sciences to achieve a total of 38 or more units (see "Approved Biology Electives" list below).
- Upper division course work must include at least 2 units (6 hours per week) of laboratory and/or fieldwork.

Note: Although a course may be listed in more than one category, that course may satisfy only one requirement.

Total units for the major.....77-94

B.S. Major Requirements:

UNITS

Preparatory Subject Matter.....55-65
- Biological Sciences 2A-2B-2C 14
- Chemistry 2A-2B-2C 15
- Chemistry 8A-8B or 118A-118B-118C 6-12
- Mathematics* 17A-17B-17C or 21A-2B (21C recommended) 8-12
- Physics 7A-7B-7C 12

*Mathematics 16A-16B-16C accepted to fulfill this requirement only for transfer students admitted prior to fall 2013.

Depth Subject Matter 49
- Biological Sciences 101, 105 (or 102+103)*, 104 10-13

*Students in the following Areas of Emphasis must complete Biological Sciences 102+103: Microbiology (Microbial Physiology and Molecular Genetics, and Microbial Diversity and Ecology options only), and Molecular and Cellular Biology. All other students (including the Biotechnology and Applied Microbiology option, and Medical Microbiology option in the Microbiology Area of Emphasis) may choose between completing Biological Sciences 105 or 102+103.
- Statistics 100 4
- Field Requirement, Area of Emphasis Requirement, and additional units (if necessary) to achieve a total of 49 units or more 32-35

Note: Although a course may be listed in more than one category, that course may satisfy only one requirement.

Field Requirement: Breadth in biology is achieved by completing one course from each field *(a)* through *(e)* below. You must take one course in each field regardless of your area of emphasis. If

you plan an area of emphasis in Evolution, Ecology and Biodiversity; Marine Biology; or Microbiology, please refer to that area of emphasis before choosing field requirement classes as specific, designated field courses are required. The required courses are listed under that area of emphasis.

Although a course may be listed in more than one category (including the area of emphasis requirements), that course may be used only once and may satisfy only one requirement.

Field Course Lists

(a) Evolution: Anthropology 151, 152, 154A; Evolution and Ecology 100; Geology 107; Plant Biology 143 3-5
(b) Ecology: Anthropology 154BN; Biological Sciences 122; Entomology 104, 156; Environmental Science and Policy 100, 121; Evolution and Ecology 101; Microbiology 120; Wildlife, Fish, and Conservation Biology 151 3-5
(c) Microbiology: Food Science and Technology 104; Microbiology 101, 102, 140, 150, 162; Pathology, Microbiology, and Immunology 127, 128; Soil Science 111..... 3-5
(d) Neurobiology, Physiology, and Behavior: Anthropology 154A; Entomology 102, 104; Neurobiology, Physiology, and Behavior 100, 101, 102, 141..... 3-5
(e) Plant Biology: Environmental Horticulture 102, 105; Evolution and Ecology 108, 117, 119, 140; Plant Biology 102, 105, 108, 111, 112, 113, 116, 117, 118, 119, 143, 147, 148; Plant Pathology 120, 130, 148; Plant Sciences 144, 176..... 3-5

Area of Emphasis Requirement: Depth in one area of biology is achieved by completing all requirements for one of the six areas of emphasis listed below. It will include at least 2 units (or 6 hours per week) of laboratory designated in the area of emphasis.

Although a course may be listed in more than one category (including the field requirements), that course may be used only once and may satisfy only one requirement.

Evolution, Ecology and Biodiversity emphasis 12

Students choose to complete Biological Sciences 105 or 102+103 for this emphasis.

Field requirement: Students must take Evolution and Ecology 100 to satisfy Field requirement (*a*), and Evolution and Ecology 101 to satisfy Field requirement (*b*).

(1) At least 12 units including at least one course from each of the following two groups..... 12

(a) Biodiversity: Entomology 103; Evolution and Ecology 105*, 106*, 108*, 112, 112L*, 114*, 134, 134L*, 134F*, 140*; Microbiology 105, 105L*; Nematology 110; Plant Biology 116*, 118*, 147*, 148*; Wildlife, Fish, and Conservation Biology 110, 110L*, 111, 111L*, 120, 120L*.
(b) Advanced Evolution and Ecology: Evolution and Ecology 102, 103, 107, 115, 117*, 119*, 138, 141, 147, 149, 150, 180A*, 180B*.

(2) Laboratory/Fieldwork Requirement. Included in the above 12 units, complete a total of 2 units or a total of 6 hours/week of fieldwork or laboratory work. Acceptable courses for this requirement are identified above by an asterisk (*)

Marine Biology emphasis 12-19

Students choose to complete Biological Sciences 105 or 102+103 for this emphasis.

Field requirement: Students must take Evolution and Ecology 100 to satisfy Field requirement *(a)*, and Evolution and Ecology 101 to satisfy Field requirement *(b)*, and Neurobiology, Physiology, and Behavior 102 or 141 to satisfy Field requirement *(d)*.

(1) Ocean Processes: At least 3 units from Biological Sciences 122; Environmental Science and Policy 124, 152; Environmental Science and Policy/ Geology116N, 150A, 150B, 150C; Evolution and Ecology 115; Wildlife, Fish, and Conservation Biology 157..... 3-4

(2) Marine Organismal Biology: At least 3 units from Animal Science 119, 131; Evolution and Ecology 106, 110, 112 and 112L, 114; Neurobiology, Physiology, and Behavior 141; Plant Biology 118; Wildlife, Fish, and Conservation Biology 120 and 120L, 121 3-5

(3) Immersion Requirement: Complete one of four options listed below, offered in spring quarter or summer sessions at Bodega Marine Laboratory, or equivalent. Requires residence at Bodega Marine Laboratory 6-10

Option 1 (summer session 1): 7
Select one course from Environmental Science and Policy 124; Evolution and Ecology 106, 110, 114.....3
Biological Sciences 124..... 3
Environmental Science and Policy/ Evolution and Ecology 111 1
Option 2 (summer session 2): 6-7
Select one course from Environmental Science and Policy 152; Geology 150C 3-4
Biological Sciences 124..... 3
Option 3 (summer session 1): 10
Environmental Toxicology/Nutrition 127
Option 4 (spring quarter): Select one course from each of the following two groups..... 8
(a.) Biological Sciences 122; Neurobiology, Physiology, and Behavior 141..... 3
(b.) Biological Sciences 122P; Neurobiology, Physiology, and Behavior 141P..... 5
Each course may only be used in satisfaction of one area of emphasis or field requirement.

Microbiology emphasis..... 12-20

Complete one of four options listed below or complete an individual option with approval from your faculty adviser.

(1) Microbial Physiology and Molecular Genetics option..... 15-18
Students must complete Biological Sciences 102+103 for this option.
Students must complete Microbiology 102 to satisfy Field requirement *(c)* Microbiology 102L, 140, 150 9
Select one course from Microbiology 170; Molecular and Cellular Biology 121, 161.....3
Select one course from Microbiology 105 and 105L, 155L, 170; Pathology, Microbiology, and Immunology 127... 3-6
(2) Microbial Diversity and Ecology option..... 15-17
Students must complete Biological Sciences 102+103 for this option.
Students must complete Microbiology 102 to satisfy Field requirement *(c)* Microbiology 102L, 105 and 105L, 120..... 12
Select one course from Food Science and Technology 104; Microbiology 140, 150, 162, 170; Pathology, Microbiology, and Immunology 127, 128; Plant Biology 148; Plant Pathology 148; Soil Science 111..... 3-5
(3) Biotechnology and Applied Microbiology option..... 16-19
Students choose to complete Biological Sciences 105 or 102+103 for this option.
Students must complete Microbiology 102 to satisfy Field requirement *(c)* Microbiology 102L 3
Select two courses from Microbiology 140, 150, 170..... 6
Select one course from Food Science and Technology 102A, 104 3-4
Select one course from Microbiology 155L; Molecular and Cellular Biology 120L, 160L 4-6
(4) Medical Microbiology option 12-20
Students choose to complete Biological Sciences 105 or 102+103 for this option.
Students may choose to complete the Field *(c)* requirement and the laboratory requirement for this option with Microbiology 101, or Microbiology 102 and 102L. Students are encouraged to complete Microbiology 101 to satisfy Field *(c)* and this option's laboratory requirement simultaneously.
Students completing Microbiology 102 for Field (c) must also complete Microbiology 102L to satisfy the laboratory requirement for this option 3
Pathology, Microbiology, and Immunology 126 3
Select one course from Medical Microbiology and Immunology 115, 116; Pathology, Microbiology, and Immunology 127 3-5
Select one course from Microbiology 105 and 105L, 162; Pathology, Microbiology, and Immunology 128.....3-6
Select one course from Microbiology 140, 150, 170 3

Molecular and Cellular Biology emphasis..... 12-17

Students must complete Biological Sciences 102+103 for this emphasis.

(1) Molecular Biology and Gene Expression: One course from Molecular and Cellular Biology 121 or 161..... 3
(2) Laboratory Experience: One or more laboratory courses from Molecular and Cellular Biology 120L, 140L, 160L; or other laboratory course to total 3 units (or 9 hours per week) that emphasizes cellular or molecular biology with approval of your faculty adviser 3-6
(3) Restricted Electives 6-8
Select two or more courses from Molecular and Cellular Biology 123, 124, 126, 143, 144, 145, 150, 162, 163, 164, 182; Neurobiology, Physiology, and Behavior 103; Pathology, Microbiology, and Immunology 126; Plant Biology 113, 126; or other courses with faculty adviser's approval.

Neurobiology, Physiology, and Behavior emphasis..... 15

Students choose to complete Biological Sciences 105 or 102+103 for this emphasis.

Although a course may be listed in more than one category (including the field requirements) that course may be used only once and may satisfy only one requirement.

Select courses from at least two of the following three areas and include one laboratory from Neurobiology, Physiology, and Behavior 101L, 104L, 141P, or 160L..... 15
(1) Neurobiology: Neurobiology, Physiology, and Behavior 100, 106, 112, 124, 125, 126, 160, 160L, 161, 162, 163, 164, 165, 168, 169; Psychology 121, 124, 128, 129.
(2) Physiology: Anatomy, Physiology and Cell Biology 100; Entomology 102; Exercise Biology 101, 110, 111, 125; Neurobiology, Physiology, and Behavior 101, 101L, 103, 104L, 105, 106, 111C, 111L, 113, 114, 117, 121, 121L, 122, 123, 127, 128, 130, 132, 139, 140, 141, 141P, 152; Pathology, Microbiology, and Immunology 126; Wildlife, Fish, and Conservation Biology 121.
(3) Behavior: Anthropology 154A, 154C; Entomology 104; Neurobiology,

Physiology, and Behavior 102, 150, 152, 159, 162; Psychology 122, 123, 129.
Note: Neurobiology, Physiology, and Behavior 106, 152 or Psychology 129 may be used only once to satisfy Area of Emphasis requirements.

Plant Biology emphasis 14-17

Students choose to complete Biological Sciences 105 or 102+103 for this emphasis.

Select one course from each of the following four areas. A course may be listed in more than one area or field, but may be used to satisfy only one requirement.
(1) Anatomy and morphology: Evolution and Ecology 140; Plant Biology 105, 116, 118..... 4-5
(2) Physiology, development and molecular biology: Plant Biology 111, 112, 113; Plant Pathology 130..... 3
(3) Evolution and ecology: Evolution and Ecology 100, 117; Plant Biology 117, 143..... 3-4
(4) Laboratory requirement: Biotechnology 161A, 161B; Evolution and Ecology 108; Plant Biology 105, 108, 116, 118, 148; Plant Pathology 148..... 4-5

Total Units for the Major 104-114

Approved Biology Electives

These courses are accepted without petition for upper division units in the Biological Science major. Many other biologically related courses may be substituted with consent of your adviser.

Anatomy, Physiology and Cell Biology 100

Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157

Avian Sciences 100, 150

Biological Sciences—All upper division courses

Cell Biology and Human Anatomy 101, 101L

Chemistry 107A, 107B, 108, 150

Entomology—All upper division courses

Environmental Horticulture 102, 105

Environmental Science and Policy 100, 110, 121, 123, 124, 150A, 150B, 150C, 151, 151L

Evolution and Ecology—All upper division courses

Exercise Biology 101, 110, 111, 113

Food Science and Technology 102A, 104

Geology 107, 107L, 150A, 150B, 150C

Medical Microbiology 115, 116

Microbiology—All upper division courses

Molecular and Cellular Biology—All upper division courses

Nature and Culture 100, 120, 140

Nematology 100, 110

Neurobiology, Physiology, and Behavior—All upper division courses

Nutrition 101, 111

Pathology, Microbiology, and Immunology 101, 102, 126, 126L, 127, 128

Philosophy 108

Plant Biology—All upper division courses, except 189

Plant Sciences 112, 130, 131, 134, 135, 142, 144, 150, 152, 153, 157, 158

Plant Pathology 120, 130

Psychology 121, 122, 123, 124, 128

Science and Technology Studies 130A, 130B, 131

Soil Science 111

Veterinary Medicine 170

Viticulture and Enology 186

Wildlife, Fish, and Conservation Biology 110, 110L, 111, 111L, 120, 120L, 121, 122, 130, 136, 140, 151

Other Upper Division Courses

There is a limitation on variable-unit courses that may be counted toward the major. Of these courses, up to 4 units of 199 courses may be counted, and no units of 192 or 197T courses may be counted.

Minor Program Requirements:

UNITS

Biological Sciences 18

Complete at least 3 units from each of the five numbered groups to total at least 18 units. Appropriate alternative courses may be used with approval of an adviser.
(1) Cell and Molecular Biology: Biological Sciences 101, 102, 105 3-4
(2) Animal Biology: Anthropology 151, Anatomy, Physiology and Cell Biology 100/ Neurobiology, Physiology, and Behavior 123; Entomology 100; Evolution and Ecology 105, 112 and 112L, 134; Nematology 100, 110; Neurobiology, Physiology, and Behavior 100, 101, 102, 117; Wildlife, Fish, and Conservation Biology 110, 111, 120 2-5
(3) Microbiology: Microbiology 101, 102, 162; Pathology, Microbiology, and Immunology 128; Plant Biology/Plant Pathology 148.....3-5
(4) Plant Biology: Environmental and Resource Sciences/Plant Sciences 144; Plant Biology 105, 111, 112, 116, 118, 126; Plant Biology/Plant Pathology 148; Plant Sciences 141, 171 3-5
(5) Evolution and Ecology: Anthropology 151, 152, 154; Entomology 100; Evolution and Ecology 100, 101, 108, 115, 117, 119, 138, 140, 147; Plant Biology 102, 108, 117, 119, 143; Plant Pathology 150; Plant Sciences 142, 146; Wildlife, Fish, and Conservation Biology 151 3-5
Additional courses (if necessary) from above numbered groups to reach 18 units.

Advisers and Advising. Information on the Biological Sciences major or minor can be obtained from the Undergraduate Academic Programs in the College of Biological Sciences Dean's Office in 202 Life Sciences.

Citation for Outstanding Performance. The College of Biological Sciences confers Citations for Outstanding Performance on undergraduates majoring in Biological Sciences who have demonstrated superior academic performance and individual achievement in research. Students who wish to be considered for a citation must first meet or exceed a specified grade point average and participate in an appropriate research project.

Teaching Credential Subject Representative. Associate Director of Teacher Education (School of Education); see the Teaching Credential/M.A. Program on page 114.

Bodega Marine Laboratory Program

See also Biological Sciences, Bodega Marine Laboratory Program, on page 182.

http://www-bml.ucdavis.edu/

A full quarter of undergraduate course work in marine biology is available each spring quarter at the Bodega Marine Laboratory, located in Bodega Bay, California. Course offerings include lecture and laboratory instruction in the developmental biology and physiological adaptation of marine organisms, and population biology and ecology; a weekly colloquium; and an intensive individual research experience under the direction of laboratory faculty (Biological Sciences courses 122, 122P, 123, 199; Neurobiology, Physiology, and Behavior 141, 141P). This is a 15 unit program and course offerings and instructors may vary from year to year.

The program is residential, with students housed on the laboratory grounds. Participants are assessed a room and board fee in addition to standard campus registration fees. An application is required. Obtain forms from the Bodega Marine Laboratory website listed above. Applications are due January 31 for spring quarter. Additional information on the Bodega Marine Laboratory Program is available from the Undergraduate Programs office in 202 Life Sciences, or directly from Bodega Marine Laboratory, P.O. Box 247, Bodega Bay, CA 94923 (707) 875-2211.

Courses in Biological Sciences (BIS)

Lower Division Courses

2A. Introduction to Biology: Essentials of Life on Earth (4)
Lecture—3 hours; discussion—1 hour. Essentials of life including sources and use of energy, information storage, responsiveness to natural selection and cellularity. Origin of life and influence of living things on the chemistry of the Earth. Not open for credit to students who have completed course 1A with a grade of C- or better.—I, II, III. (I, II, III.) Roth

2B. Introduction to Biology: Principles of Ecology and Evolution (5)
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 1A or 2A. Introduction to basic principles of ecology and evolutionary biology, focusing on the fundamental mechanisms that generate and maintain biological diversity across scales ranging from molecules and genes to global processes and patterns. Not open for credit for student who have completed Biological Sciences 1B with a grade of C- or better.—I, II, III. (I, II, III.) Grosberg, Holyoak, Keen, Patricelli, Rosenheim, Schwartz, Stachowicz, Strauss, Strong

2C. Introduction to Biology: Biodiversity and the Tree of Life (5)
Lecture—4 hours; laboratory—3 hours. Prerequisite: course 1B or 2B. Introduction to organismal diversity, using the phylogenetic tree of life as an organizing theme. Lectures and laboratories cover methods of phylogenetic reconstruction, current knowledge of the tree of life, and the evolution of life's most important and interesting innovations. Not open for credit to students who have completed course 1C with a grade of C- or better.—I, II, III. (I, II, III.) Doyle, Eisen, Keen, Maloof, Moore, Rizzo, Shaffer, Sinha, Wainwright, Ward

10. General Biology (4)
Lecture/discussion—4 hours. Concepts and issues in biology. Emphasis on composition and structure of organisms; regulation and signaling; heredity, evolution and the interaction and interdependence among life forms and their environments. Designed for students not specializing in biology. Not open for credit to students who have completed course 1A, 2A or 10V. GE credit: SciEng.—I. (I.) Goldberg

10V. General Biology (4)
Web virtual lecture—3 hours; web electronic discussion—1 hour. Concepts and issues in biology. Emphasis on composition and structure of organisms; regulation and signaling; heredity, evolution and the interaction and interdependence among life forms and their environments. Significant writing is required. Designed for students not specializing in biology. Not open for credit to students who have completed course Biological Sciences 1A, 1B, 1C, 2A, 2B, 2C, or 10. (Same course as Nematology 10V.) GE credit: SciEng, Wrt.—III. (III.) Westerdahl

11. Issues in the Life Sciences (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: enrollment limited to BUSP students, consent of instructor. The range of subjects and approaches in the field of biology, including both basic and applied research topics.—I. (I.)

11L. Basic Life Sciences Laboratory (2)
Laboratory—6 hours. Prerequisite: enrollment limited to BUSP students, consent of instructor. Basic laboratory skills in life sciences research, including microbiology, molecular biology, and genetics.—IV. (IV.)

20Q. Modeling in Biology (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: Mathematics 16B (may be taken concurrently). Introduction to the application of quantitative methods to biological problems. Students will use a mathematical software package to tackle problems drawn from all aspects of biology.—II, III. (II, III.) Mogilner, Sutter

92. Internship in Biological Sciences (1-12)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Genes and Gene Expression (4)
Lecture—4 hours. Prerequisite: courses BIS 1A and 1B, or 2A, 2B and 2C (2C may be taken concurrently); Chemistry 8B or 118B or 128B (may be taken concurrently). Nucleic acid structure and function; gene expression and its regulation; replication; transcription and translation; transmission genetics; molecular evolution.—I, II, III. (I, II, III.) Brady, S. Chan, Draper, Dvorak, Engebrecht, Heyer, Kliebenstein, O'Neill, Rodriguez, Sanders

101D. Genes and Gene Expression Discussion (1)
Discussion—1 hour. Prerequisite: course 101 concurrently. Discussion and problem solving related to fundamental principles of classical and molecular genetics as presented in course 101. (P/NP grading only.)—I, II, III. (I, II, III.)

102. Structure and Function of Biomolecules (3)
Lecture—3 hours. Prerequisite: course 1A or 2A; Chemistry 8B or 118B or 128B. Structure and function of macromolecules with emphasis on proteins, catalysis, enzyme kinetics, lipids, membranes, and proteins as machines. Only one unit of credit for students who have completed Biological Sciences 105 or Animal Biology 102.—I, II, III. (I, II, III.) Cheng, Etzler, Gasser, Hilt, Leary

102Q. Quantitative Biomolecule Concepts (1)
Project—1 hour; autotutorial. Prerequisite: course 102 (may be taken concurrently). Study of the quantitative concepts and mathematical models fundamental to biochemistry. Offered irregularly.—Hilt, Theg

103. Bioenergetics and Metabolism (3)
Lecture—3 hours. Prerequisite: course 102. Fundamentals of the carbon, nitrogen, and sulfur cycles in nature, including key reactions of biomolecules such as carbohydrates, amino acids, lipids, and nucleotides, and of energy production and use in different types of organisms. Principles of metabolic regulation. One unit of credit for students who have completed Biological Sciences 105 or Animal Biology 103.—I, II, III. (I, II, III.) Callis, Fiehn, Hilt, Inouye

104. Regulation of Cell Function (3)
Lecture—3 hours. Prerequisite: course 101; 102 or 105. Membrane receptors and signal transduction; cell trafficking; cell cycle; cell growth and division; extracellular matrix and cell-cell junctions; cell development; immune system.—I, II, III. (I, II, III.) Dinesh-Kumar, Edwards, Etzler, Kaplan, S. Lin, B. Liu. McNally, Privalsky, Shiozaki, Starr

105. Biomolecules and Metabolism (3)
Lecture—3 hours. Prerequisite: courses 1A, 1B, and 1C, or 2A, 2B, and 2C; course 101; Chemistry 8B or 118B or 128B. Fundamentals of biochemical processes, with emphasis on protein structure and activity; energy metabolism; catabolism of sugars, amino acids, and lipids; and gluconeogenesis. No credit for students who have completed both courses 102 and 103. One unit of credit for students who have completed course 102 or 103. No credit for students who have completed both course 102 and 103. One unit of credit for students who have completed Animal Biology 102 or 103. No credit for students who have completed both Animal Biology 102 and 103.—I, II, III. (I, II, III.) Fiehn, Hilt, Murphy, Theg

122. Population Biology and Ecology (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 1A, 1B, 1C, or 2A, 2B, 2C; residence at Bodega Marine Laboratory required. Biological and physical processes affecting plant and animal populations in the rich array of habitats at the Bodega Marine Laboratory ecological preserve. Emphasis on field experience, with complementing lectures to address population and community processes. See Bodega Marine Laboratory Program.—III. (III.) Morgan

122P. Population Biology and Ecology/ Advanced Laboratory Topics (5)
Laboratory—12 hours; discussion—1 hour. Prerequisite: course 122 concurrently. Residence at Bodega Marine Laboratory required. Training in scientific research, from hypothesis testing to publication, including methods of library research. Research related to topic covered in course 122. Final presentation both oral and written. (See Bodega Marine Laboratory Program.)—III. (III.) Chang, Cherr, Morgan

123. Undergraduate Colloquium in Marine Science (1)
Seminar—1 hour. Prerequisite: enrolled student at the Bodega Marine Laboratory. Series of weekly seminars by recognized authorities in various disciplines of marine science from within and outside the UC system. Includes informal discussion with speaker. Course will be held at Bodega Marine Laboratory. (P/NP grading only.) (See above description for Bodega Marine Laboratory Program.)—III. (III.)

124. Coastal Marine Research (3)
Laboratory—6 hours; fieldwork—6 hours; laboratory/discussion—1 hour. Prerequisite: upper division standing or consent of instructor; concurrent enrollment in at least one course from Environmental Science and Policy 124, 152, Evolution and Ecology 106, 110, 114; residence at or near Bodega Marine Lab required. Student must complete the application available at http://www.bml.ucdavis.edu. Independent research on topics related to the accompanying core Bodega Marine Laboratory summer courses. Students will select one instructor to be primary mentor, but integrative topics that draw on the expertise of several BML faculty members will be encouraged. May be repeated two times for credit.—IV. (IV.) Gaylord, Hill, Largier, Morgan, Sanford

132. Introduction to Dynamic Models in Modern Biology (4)
Lecture—3 hours; laboratory—2 hours. Prerequisite: Mathematics 16C, Statistics 13, one lower division course in biology, or the equivalents. Dynamic modeling in the biological sciences, including matrix models, difference equations, differential equations, and complex dynamics. Examples include classic models in ecology, cell biology, physiology, and neuroscience. Emphasis on understanding models, their assumptions, and implications for modern biology. GE credit: Wrt.—I. (I.) Hom

133. Collaborative Studies in Mathematical Biology (3)
Lecture/discussion—3 hours. Prerequisite: Mathematics 16ABC or the equivalent, one course from course 1A, 1B, 1C, 2A, 2B, 2C, 10 or the equivalent in biology, consent of instructor. Interdisciplinary research and training that uses mathematics and computation to solve current problems in biology. Not offered every year. May be repeated six times for credit.—I, II, III. (I, II, III.) Grosberg, Schreiber

192. Internship in Biological Sciences (1-12)
Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

194H. Research Honors (2)
Independent study—6 hours. Prerequisite: senior standing. Students majoring in Biological Sciences who have completed two quarters (3-5 units per quarter) of 199 and who qualify for the honors program as defined by the current catalog. Opportunity for Biological Sciences majors to pursue intensive research culminating in the writing of a senior thesis with the guidance of faculty advisers. (P/NP grading only.)

195A. Science Teaching Internship Program (4)
Lecture/discussion—2 hours; internship—6 hours. Prerequisite: upper division standing in a science major or consent of instructor. Basic teaching techniques including lesson planning, classroom management, and presentation skills. Interns spend time in K-12 science classrooms working with a master teacher observing, assisting with labs and activities, managing students, and teaching lessons. (P/NP grading only.)

195B. Science Teaching Internship (1-5)
Internship—3-15 hours. Prerequisite: course 195A. Reinforcement of teaching techniques learned in 195A with additional classroom experiences in K-12 science classrooms working with a master teacher observing, assisting with labs and activities, managing students, and teaching lessons. May be repeated one time for credit with consent of instructor. (P/NP grading only.)

197T. Tutoring in Biological Sciences (1-5)
Discussion—2-6 hours. Prerequisite: upper division standing and consent of instructor. Assisting the instructor by tutoring students in one of the Biological Sciences' regular courses. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study in Biological Sciences (1-5)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Course

298. Group Study (1-5)
Prerequisite: consent of instructor. College of Biological Sciences staff members may offer group study courses under this number.

Biomedical Engineering (A Graduate Group)

Tonya L. Kuhl, Ph.D., Chairperson of the Group
(530) 754-5911

Group Office. 2303 Genome and Biomedical Sciences Facility (530) 752-2611;
http://www.bme.ucdavis.edu/graduate/

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Kyriacos Athanasiou, Ph.D., Professor *(Biomedical Engineering)*
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David Rocke, Ph.D., Professor *(Public Health Sciences, Applied Science)*
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Keith R. Williams, Ph.D., Senior Lecturer *(Neurology, Physiology and Behavior)*
Erik Wisner, D.V.M., Professor *(Surgical and Radiological Sciences)*
Soichiro Yamada, Ph.D. Assistant Professor *(Biomedical Engineering)*
Yin Yeh, Ph.D., Professor *(Applied Science)*
Yohei Yokobayashi, Ph.D., Associate Professor *(Biomedical Engineering)*

Emeriti Faculty

V. Ralph Algazi, Ph.D., Professor Emeritus *(Electrical and Computer Engineering)*
R. Bruce Martin, Ph.D., Professor *(Orthopaedic Research Labs)*
Melvin R. Ramey, Ph.D., Professor *(Civil and Environmental Engineering)*

Graduate Study. The Graduate Group in Biomedical Engineering offers programs of study and research leading to the M.S. and Ph.D. degrees. The programs of study prepare students for professional work in the effective integration of engineering with medical and biological sciences. Research strengths lie in the areas of imaging, sensor and MEMs systems, cellular and molecular mechanics, computational modeling, targeted therapeutics, orthopedic biomechanics, biofluids and transport, and human movement. This broad interdepartmental program is best suited for students who are capable of and comfortable with considerable independence. Each student, together with an adviser, defines a specific course of study suited to individual goals.

Preparation. The Group regards strong competence in mathematics and engineering as necessary for successful completion of study. Prior course work in these areas is emphasized in the evaluation of applications. Some undergraduate training can be acquired after admission to the Group, but it may require an additional year of study.

Courses. See Engineering: Biomedical, on page 242.

Biophysics (A Graduate Group)

Marjorie Longo, Ph.D., Chairperson of the Group

Group Office. 310 Life Sciences;
(530) 752-4863;
http://biosci2.ucdavis.edu/ggc/bph/

Faculty

Toby Allen, Ph.D., Associate Professor *(Chemistry)*
James B. Ames, Ph.D., Associate Professor *(Chemistry)*
Abdul I. Barakat, Ph.D., Professor *(Mechanical and Aerospace Engineering)*
Craig J. Benham, Ph.D., Professor *(Mathematics, Biomedical Engineering)*
R. David Britt, Ph.D., Professor *(Chemistry)*
Tsung-Yu Chen, Ph.D., Associate Professor *(Neurology)*
R. Holland Cheng, Ph.D., Professor *(Molecular and Cellular Biology)*
Daniel L. Cox, Ph.D., Professor *(Physics)*
Stephen P. Cramer, Ph.D., Professor *(Applied Science)*
Yong Duan, Ph.D., Professor *(Applied Science)*
Robert H. Fairclough, Ph.D., Associate Professor *(Neurology)*
Roland Faller, Ph.D., Associate Professor *(Chemical Engineering and Materials Science)*
Andrew J. Fisher, Ph.D., Professor *(Chemistry)*
Alla F. Fomina, Ph.D., Assistant Professor *(Physiology and Membrane Biology)*
Samantha P. Harris, Ph.D., Assistant Professor *(Neurobiology, Physiology and Behavior)*
Volkmar Heinrich, Ph.D., Assistant Professor *(Biomedical Engineering)*
Thomas Huser, Ph.D., Associate Professor *(Medicine: Endocrinology)*
Niels G. Jensen, Ph.D., Professor *(Applied Science)*
Thomas Jue, Ph.D., Professor *(Med: Biochemistry and Molecular Medicine)*
Patrice Koehl, Ph.D., Associate Professor *(Computer Science)*
Stephen C. Kowalczykowski, Ph.D., Professor *(Microbiology)*
Denise Krol, Ph.D., Professor *(Applied Science)*
Tonya L. Kuhl, Ph.D., Professor *(Chemical Engineering and Materials Science)*
Delmar Larsen, Ph.D., Assistant Professor *(Chemistry)*
Janine M. LaSalle, Ph.D., Professor *(Microbiology and Immunology)*
Julie A. Leary, Ph.D., Professor *(Molecular and Cellular Biology)*
Carlito B. Lebrilla, Ph.D., Professor *(Chemistry)*
Gang-yu Liu, Ph.D., Professor *(Chemistry)*
Marjorie L. Longo, Ph.D., Professor *(Chemical Engineering and Materials Science)*
Laura Marcu, Ph.D., Professor *(Biomedical Engineering)*
Atul N. Parikh, Ph.D., Professor *(Applied Science)*
Subhadip Raychaudhuri, Ph.D., Assistant Professor *(Biomedical Engineering)*
Leonor Saiz, Ph.D., Assistant Professor *(Biomedical Engineering)*
Jonathan M. Scholey, Ph.D., Professor *(Molecular and Cellular Biology)*
Scott I. Simon, Ph.D., Professor *(Biomedical Engineering)*
Rajiv R. Singh, Ph.D., Professor *(Physics)*
Alexei Stuchebrukhov, Ph.D., Professor *(Chemistry)*
Ilias Tagkopoulos, Ph.D., Assistant Professor *(Computer Science)*
Steven M. Theg, Ph.D., Professor *(Plant Biology)*
Michael D. Toney, Ph.D., Associate Professor *(Chemistry)*
John C. Voss, Ph.D., Professor *(Biochemistry and Molecular Medicine)*
David K. Wilson, Ph.D., Professor *(Molecular and Cellular Biology)*
Yin Yeh, Ph.D., Professor *(Applied Science)*

Emeriti Faculty

Ronald J. Baskin, Ph.D., Professor Emeritus
Morton Bradbury, Ph.D., Professor Emeritus
John H. Crowe, Ph.D., Professor Emeritus
William H. Fink, Ph.D., Professor Emeritus
Jerry L. Hedrick, Ph.D., Professor Emeritus
Distinguished Graduate Mentoring Award
Gerd N. LaMar, Ph.D., Professor Emeritus
Carl W. Schmid, Ph.D., Professor Emeritus

Graduate Study. The Graduate Group in Biophysics offers programs of study leading to the Ph.D. degree. Biophysics is a broad interdepartmental program that is ideal for students who are comfortable with considerable independence. The emphasis is on molecular biophysics. The curriculum consists of certain core courses in biology, chemistry, and physics, followed by specialty courses related to research interests. Specific program requirements are decided in consultation with a research supervisor and the graduate adviser.

Graduate Advisers. R. D. Britt *(Chemistry)*, W.H. Fink *(Chemistry)*, C. Lebrilla *(Chemistry)*, M. L. Longo *(Chemical Engineering and Materials Science)*, S. M. Theg *(Plant Biology)*, A. Parikh *(Applied Science)*

Courses in Biophysics (BPH)

Graduate Courses

200. Current Techniques in Biophysics (2)
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 102 or 104 or the equivalent. Current techniques in biophysics research including diffraction, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electrophysiology. (Same course as Molecular and Cellular Biology 200C.) (S/U grading only.)—III. (III.)

200A. Current Techniques in Biophysics (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102 or equivalent; Chemistry 110A or equivalent. Current techniques in Biophysics. Topics in 200A include mathematical methods, modeling, mass spectrometry, stochastic process, scanning probe microscopy, electron microscopy, fluorescence, membrane diffusion/mechanics, and single particle tracking. (S/U grading only.)—II. (II.) Faller

200B. Current Techniques in Biophysics (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102 or equivalent; Chemistry 110A. Current Techniques in Biophysics. Topics include protein folding, membrane structure and dynamics, Raman spectroscopy, fluorescence resonance energy transfer, time resolved fluorescence, quantum dot, fluorescence imaging, esr, high resolution nmr, and in vivo nmr. (S/U grading only.)—III. (III.) Jue

200LA. Biophysics Laboratory (3)
Laboratory—18 hours. Prerequisite: course 200 (may be taken concurrently). One five-week laboratory assignment in the research laboratory of a Biophysics Graduate Group faculty member. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit four times.—I, II, III. (I, II, III.)

200LB. Biophysics Laboratory (6)
Laboratory—two 18-hour rotations. Prerequisite: course 200 (may be taken concurrently). Two five-week laboratory assignments in the research laboratories of Biophysics Graduate Group faculty members. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit two times.—I, II, III. (I, II, III.)

231. Biological Nuclear Magnetic Resonance (3)
Lecture—3 hours. Prerequisite: Molecular and Cellular Biology 221A or the equivalent or consent of instructor. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biophysical basis for magnetic resonance applications in areas of tissue characterization/imaging, metabolic regulation, and cellular bioenergetics. (Same course as Biological Chemistry 231.) Offered in alternate years.—III. (III.) Jue

241. Membrane Biology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102, 103, 104 or consent of instructor. Advanced topics on membrane biochemistry and biophysics. Relationship of the unique properties of biomembranes to their roles in cell biology and physiology. (Same course as Molecular and Cellular Biology 241.)—III. (III.) Crowe, Longo, Voss

271. Optical Methods in Biophysics (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 102 or the equivalent, Applied Science Engineering 108B or the equivalent, and Chemistry 110A or the equivalent. Principal optical techniques used to study biological structures and their related functions. Specific optical techniques useful in the studies of protein-nucleic acid, protein-membrane and protein-protein interactions. Biomedical applications of optical techniques. (Same course as Applied Science Engineering 271.)—III. (III.) Huser, Parikh, Yeh

290. Biophysics Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Presentation of current research by experts in biophysics. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Research Conference in Biophysics (1)
Discussion—1 hour. Prerequisite: graduate standing in Biophysics and/or consent of instructor; course 299 concurrently. Presentation and discussion of faculty and graduate-student research in biophysics. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

293. Introduction to Research Topics (1)
Seminar—1 hour. Presentation of current research activities of the Biophysics Graduate Group faculty. Facilitation of students in developing their research interest, and promoting collegial interactions. May be repeated one time for credit. (S/U grading only.)—I. (I.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Biostatistics (A Graduate Group)

Richard E. Plant, Ph.D. *(Plant Sciences)*, Chairperson of the Group

Group Office. 4118 Mathematical Sciences Building (530) 692-5194; *http://biostat.ucdavis.edu/*

Faculty

Rahman Azari, Ph.D., Lecturer *(Statistics)*
Laurel Beckett, Ph.D., Professor *(Public Health Sciences)*
Prabir Burman, Ph.D., Professor *(Statistics)*
Andrew J. Clifford, Ph.D., Professor *(Nutrition)*
Christiana Drake, Ph.D., Professor *(Statistics)*
Thomas R. Famula, Ph.D., Professor *(Animal Science)*
Thomas B. Farver, Ph.D., Professor *(Population Health and Reproduction)*
Danielle Harvey, Ph.D., Assistant Adjunct Professor *(Public Health Sciences)*
Fushing Hsieh, Ph.D., Professor *(Statistics)*
Ana-Maria Iosif, Ph.D., Assistant Professor *(Public Health Sciences)*
Jiming Jiang, Ph.D., Professor *(Statistics)*
Philip H. Kass, Ph.D., Professor *(Population Health and Reproduction)*
Kyoungmi Kim, Ph.D., Assistant Professor *(Public Health Sciences)*
Chin-Shang Li, Ph.D., Assistant Professor *(Public Health Sciences)*
Hans-Georg Müller, M.D., Ph.D., Professor *(Statistics)*
Debashis Paul, Ph.D., Assistant Professor *(Statistics)*
Jie Peng, Ph.D., Associate Professor *(Statistics)*
Lihong Qi, Ph.D., Assistant Professor *(Public Health Sciences)*
David M. Rocke, Ph.D., Professor *(Public Health Sciences)*
George G. Roussas, Ph.D., Professor *(Statistics)*
Francisco J. Samaniego, Ph.D., Professor *(Statistics)*
Chih-Ling Tsai, Ph.D., Professor *(Graduate School of Management)*
Jane-Ling Wang, Ph.D., Professor *(Statistics)*
Xiaowei Yang, Ph.D., Assistant Professor *(Public Health Sciences)*

Graduate Study. Biostatistics is a field of science that uses quantitative methods to study life sciences related problems that arise in a broad array of fields. The program provides students with, first, solid training in the biostatistical core disciplines and theory; second, with state-of-the art knowledge and skills for biostatistical data analysis; third, substantial exposure to the biological and epidemiological sciences; and fourth, with a strong background in theoretical modeling, statistical techniques and quantitative as well as computational methods. Programs of study and research are offered leading to the M.S. and Ph.D. degrees. The program prepares students for interdisciplinary careers ranging from bioinformatics, environmental toxicology and stochastic modeling in biology and medicine to clinical trials, drug development, epidemiological and medical statistics. The program draws on the strengths of the Biostatistics faculty at UC Davis.

Preparation. Students should have one year of calculus; a course in linear algebra or one year of biological course work; facility with a programming language; and upper-division work in at least one of Mathematics, Statistics and Biology.

Graduate Adviser. Hans-Georg Müller *(Statistics)*

Courses in Biostatistics (BST)

Graduate Courses

222. Biostatistics: Survival Analysis (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Statistics 131C. Incomplete data; life tables; nonparametric methods; parametric methods; accelerated failure time models; proportional hazards models; partial likelihood; advanced topics. (Same course as Statistics 222.)—I.

223. Biostatistics: Generalized Linear Models (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Statistics 131C. Likelihood and linear regression; generalized linear model; Binomial regression; case-control studies; dose-response and bioassay; Poisson regression; Gamma regression; quasi-likelihood models; estimating equations; multivariate GLMs. (Same course as Statistics 223.)—II.

224. Analysis of Longitudinal Data (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course/Statistics 222, 223, Statistics 232B or consent of instructor. Standard and advanced methodology, theory, algorithms, and applications relevant for analysis of repeated measurements and longitudinal data in biostatistical and statistical settings. (Same course as Statistics 224.)—III. (III.)

225. Clinical Trials (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course/Statistics 223 or consent of instructor. Basic statistical principles of clinical designs, including bias, randomization, blocking, and masking. Practical applications of widely-used designs, including dose-finding, comparative and cluster randomization designs. Advanced statistical procedures for analysis of data collected in clinical trials. (Same course as Statistics 225.) Offered in alternate years.—III.

226. Statistical Methods for Bioinformatics (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C or consent of instructor; data analysis experience recommended. Standard and advanced statistical methodology, theory, algo-

rithms, and applications relevant to the analysis of -omics data. (Same course as Statistics 226.) Offered in alternate years.—(II.)

252. Advanced Topics in Biostatistics (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 222, 223. Biostatistical methods and models selected from the following: genetics, bioinformatics and genomics; longitudinal or functional data; clinical trials and experimental design; analysis of environmental data; dose-response, nutrition and toxicology; survival analysis; observational studies and epidemiology; computer-intensive or Bayesian methods in biostatistics. May be repeated for credit with consent of adviser when topic differs. (Same course as Statistics 252.) Offered in alternate years.—III.

290. Seminar in Biostatistics (1)
Seminar—1 hour. Seminar on advanced topics in the field of biostatistics. Presented by members of the Biostatistics Graduate Group and other guest speakers. May be repeated for up to 12 units of credit. (S/U grading only.)—I, II, III.

298. Directed Group Study (1-5)
Prerequisite: consent of instructor.

299. Special Study for Biostatistics Graduate Students (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

299D. Dissertation Research (1-12)
Prerequisite: advancement to Candidacy for Ph.D. and consent of instructor. Research in biostatistics under the supervision of major professor. (S/U grading only.)

Biotechnology

(College of Agricultural and Environmental Sciences)

Faculty. Faculty includes members of the Departments of Animal Science, on page 150; Engineering: Chemical Engineering and Materials Science, on page 246; Computer Science, on page 206; Engineering: Biological and Agricultural, on page 238; Food Science and Technology, on page 305; Land, Air and Water Resources, on page 354; Plant Pathology, on page 460; Plant Sciences, on page 461; Viticulture and Enology, on page 530; and the College of Biological Sciences, on page 175.

The Major Program

Every living organism, from the smallest and most primitive bacteria to every plant, insect, animal or human being, contains DNA as the primary genetic material. DNA directs all cellular processes, creating the incredible variety and diversity of living organisms in the biosphere. Biotechnology focuses on the mechanics of life processes and their application. Biotechnology means "life technology" and represents an integrated, multidisciplinary field, with a profound impact today on almost every aspect of human endeavor.

Preparatory Requirements. UC Davis students who wish to change their major to Biotechnology must complete the following preparatory courses with a combined grade point average of at least 2.500. All of these courses must be taken for a letter grade:

	UNITS
Biological Sciences 1A, 1B, 1C or 2A, 2B, 2C	14-15
Chemistry 2A, 2B, 2C	15
Chemistry 8A, 8B or 118A, 118B, 118C or 128A, 128B, 128C, 129A	6-12
Mathematics 16A, 16B, or 17A, 17B or 21A, 21B	6-8
Physics 7A, 7B	8
Plant Sciences 120 or Statistics 100	4
Biotechnology 1	4

The Program. In the first two years, students develop a strong and general background in biological science with an emphasis on fundamental concepts and basic principles of genetics, molecular biology and cell biology. Four options, Animal Biotechnology, Plant Biotechnology, Fermentation/Microbial Biotechnology, and Bioinformatics, provide in-depth training and specialized knowledge in an aspect of biotechnology. Each option has a strong laboratory component to reinforce the theoretical concepts. Students also do an internship in a biotechnology company or university or government laboratory.

Internships and Career Opportunities. In the last decade, more industries are turning to biotechnology to solve problems and improve products, creating a growing job market for individuals trained in biotechnology in the agricultural, food and beverage, health care, chemical, pharmaceutical and biochemical, and environmental and bioremediation industries.

Graduates trained in the technologies designed for biotechnology will find their training applicable to advanced research in molecular biology, genetics, biochemistry, and the plant and animal sciences.

B.S. Major Requirements:

	UNITS
Preparatory Subject Matter	**57-70**
Biological Sciences 1A, 1B, 1C or 2A, 2B, 2C	14-15
Chemistry 2A, 2B, 2C	15
Chemistry 8A, 8B or 118A, 118B, 118C or 128A, 128B, 128C, 129A	6-12
Mathematics 16A, 16B, or 17A, 17B or 21A, 21B	6-8
Physics 7A, 7B	8
Plant Sciences 120 or Statistics 100	4
Biotechnology 1	4
Select one course from: University Writing Program 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 104A, 104B, 104C, 104D, 104E, 104F (may overlap with college composition requirement)	0-4
Depth Subject Matter	**26-32**
Biological Sciences 101	4
Microbiology 102	4
Animal Biology 102 or Biological Sciences 102	3-5
Animal Biology 103 or Biological Sciences 103	3-5
Biological Sciences 104	3
Molecular and Cellular Biology 161	3
Biotechnology 171	3
Internship or independent research; course 192 or 199 or Biotechnology 189L	3
Undergraduate research proposal: Biotechnology 188 (optional)	3
Honors undergraduate thesis (optional)	1
Areas of Specialization (choose one)	
Fermentation/Microbiology Biotechnology Option	**31-34**
Engineering: Chemical 160; Microbiology 140 and 150, or Plant Pathology 130 and Microbiology 170; Microbiology 102L or Food Science and Technology 104L; Molecular and Cellular Biology 160L or Biotechnology 161A	16-19
Restricted Electives	15
Select from: Biotechnology 150, 161B, Chemistry 107A, 107B, Engineering: Biological Systems 160, Engineering: Chemical 161C, 161L, Evolution and Ecology 100, Food Science and Technology 102A, 102B, 104, 104L, 110A, 110B, 123, 123L, Microbiology 105, 105L, 140, 150, 155L, 162, 170, Molecular and Cellular Biology 120L, 164, Plant Pathology 130, 140, Viticulture and Enology 124, 124L, 128, 135, 186.	
Plant Biotechnology Option	**34**
Biotechnology 160, 161A, 161B, Molecular and Cellular Biology 126, Plant Sciences 152	22
Restricted Electives	12
Select at least one course from each of the following areas: *(a) Pests, Pathogens and Production:* Biotechnology 150, Entomology 110, Evolution and Ecology 100, Microbiology 162, Molecular and Cellular Biology 120L, 164, Nematology 100 or 110, Plant Pathology 120, 123, 130, 140, Plant Biology 143, Plant Sciences 146, 151, 153, 154, 172, 173 *(b) Growth and Development:* Biotechnology 150, Evolution and Ecology 100, Molecular and Cellular Biology 120L, Plant Biology 105, 111, 112, Plant Pathology 140, Plant Sciences 157, 158	
Animal Biotechnology Option	**33**
Animal Genetics 111, Neurobiology, Physiology, and Behavior 101, Molecular and Cellular Biology 150, 150L, 182, Animal Science 170	21
Restricted Electives	12
Select at least one course from each of the following areas: *(a) Animal cell biology/microbiology/immunology:* Animal Genetics 101, Biotechnology 150, 161A, 161B, Evolution and Ecology 100, Medical Microbiology 188 or Pathology, Microbiology, and Immunology 126, Microbiology 102L, 162, Molecular and Cellular Biology 120L, 160L, Pathology, Microbiology, and Immunology 126L, 127, 128, Physiology, Molecular, Cellular, and Integrative Physiology 200L, Neurology, Physiology, and Behavior 131, Plant Pathology 140 *(b) Animal reproduction and breeding:* Animal Genetics 107, Animal Science 131, 140, Avian Sciences 103, 121, Evolution and Ecology 102, Molecular and Cellular Biology 164, Neurobiology, Physiology, and Behavior 121, 121L, Plant Pathology 140	
Bioinformatics Option	**31**
Biotechnology 150, Engineering: Computer Science 20, 30, 124, Molecular and Cellular Biology 182 or Neurobiology, Physiology, and Behavior 131	19
Restricted Electives	12
Select from: Animal Genetics 120, 212, Biological Sciences 132, Engineering: Applied Science 289, Engineering: Computer Science 40, 50, 60, 122A, 140A, 150, 154A, 189K, Evolution and Ecology 100, 102, 103, Mathematics 124, Statistics 130A or 131A, 130B or 131B, 141	
Total Units for the Major	**114-136**

Major Adviser: J.I. Yoder *(Plant Sciences)* in 101 Asmundson Hall

Advising Center for the major is located in 1220 Plant and Environmental Sciences (530) 752-1715.

Courses in Biotechnology (BIT)

Lower Division Courses

1. Introduction to Biotechnology (4)
Lecture—3 hours; discussion—1 hour. Principles and applications of biotechnology. Topics include microbial biotechnology, agricultural biotechnology, biofuels, cloning, bioremediation, medical biotechnology, DNA fingerprinting and forensics. GE Credit: Sci-Eng.—III. (III.) Dandekar, Yoder

92. Internship in Biotechnology (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in subject area pertaining to biotechnology or in a business, industry or agency associated with biotechnology. Internship supervised by faculty member in the animal or plant sciences. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

150. Applied Bioinformatics (4)
Lecture—2 hours; laboratory/discussion—2 hours. Prerequisite: Computer Science Engineering 10 or 15 or Plant Sciences 21; Biological Sciences 101 and 104; Plant Sciences 120 or Statistics 13 or Statistics 100. Concepts and programs needed to apply bioinformatics in biotechnology research. Sequence analysis and annotation and use of plant and animal databases for students in biological and agricultural sciences. Limited enrollment. Two units of credit for students who have completed Computer Science Engineering 124.—I. (I.) Dubcovsky, Neale

160. Principles of Plant Biotechnology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A or 2A; Biological Sciences 101 or Plant Sciences 152. Principles and concepts of plant biotechnology including recombinant DNA technology, molecular biology, genomics, cell and tissue culture, gene transfer and crop improvement strategies using transgenic crops. Not open for credit to students who have completed Plant Biology 160. (Former course Plant Biology 160.)—II. (II.) Dandekar

161A. Genetics and Biotechnology Laboratory (6)
Lecture—3 hours; laboratory—9 hours. Prerequisite: Plant Sciences 152 or Biological Sciences 101; consent of instructor. Techniques of genetic analysis at the molecular level including recombinant DNA, gene mapping and basic computational biology. Not open for credit to students who have completed Plant Biology 161A.—II. (II.) Beckles

161B. Plant Genetics and Biotechnology Laboratory (6)
Lecture—3 hours; laboratory—9 hours. Prerequisite: Plant Sciences 152 or Biological Sciences 101. Advanced techniques of genetic analysis at the molecular and organismal levels, including transformation, gene expression, analysis of transgenic plants and QTL analysis. Not open for credit to students who have taken Plant Biology 161B. (Former course Plant Biology 161B.)—III. (III.) Bennett, Blumwald

171. Professionalism and Ethics in Genomics and Biotechnology (3)
lecture—1 hour; discussion—2 hours. Prerequisite: upper division standing in a natural science major. Real and hypothetical case studies to illustrate ethical issues in genomics and biotechnology. Training and practice in difficult ethical situations and evaluating personal and social consequences.—I, II, III. (I, II, III.) Yoder, Bradford

188. Undergraduate Research Proposal (3)
Lecture/discussion—3 hours. Prerequisite: upper division standing. Preparation and review of a scientific proposal. Problem definition, identification of objectives, literature survey, hypothesis generation, design of experiments, data analysis planning, proposal outline and preparation. (Same course as Plant Sciences 188.) GE Credit: Wrt.—III. (III.) Kliebenstein

189L. Laboratory Research in Genomics and Biotechnology (2-5)
Laboratory—3-12 hours; discussion—1 hour. Prerequisite: course 188 and consent of instructor. Formulating experimental approaches to current questions in biotechnology; performance of proposed experiments. May be repeated for credit up to 12 units. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship in Biotechnology (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in a subject area pertaining to biotechnology or in a business, industry or agency associated with biotechnology. Internship supervised by faculty member in the animal or plant sciences. (P/NP grading only.)

194H. Honors Thesis in Biotechnology (1-5)
Independent Study—3-15 hours. Prerequisite: senior standing in Biotechnology with 3.250 GPA or higher and completion of courses 188 and 189L. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. (Deferred grading only, pending completion of sequence.) (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Bodega Marine Laboratory Program

http://www.bml.ucdavis.edu/

See also Biological Sciences, Bodega Marine Laboratory Program, on page 177.

Spring Quarter Program

A full quarter of undergraduate course work in marine biology is available each spring quarter at the Bodega Marine Laboratory, located in Bodega Bay, California. Course offerings include lecture and laboratory instruction in the developmental biology and physiological adaptation of marine organisms, and population biology and ecology; a weekly colloquium; and an intensive individual research experience under the direction of laboratory faculty (Biological Sciences courses 120, 120P, 122, 122P, 123; Neurobiology, Physiology, and Behavior 141, 141P). This is a 15 unit program and course offerings and instructors may vary from year to year. Applications are due January 31.

For more course detail, see full description under appropriate academic department listing or *http://www.bml.ucdavis.edu/*.

Summer Special Session Courses

This integrated program offers students a multidisciplinary understanding of coastal ecosystems through intensive, hands on courses taught at Bodega Marine Laboratory. The program offers students three sequences of instruction with up to 10 units in each. Two sequences occur during the first Summer Session dates and one sequence in the second Summer Session dates. Applications are due April 15.

For more course detail, see full description under appropriate academic department listing or *http://www.bml.ucdavis.edu/*.

Sequences are:

Marine Organisms and Ecology of the California Coast. Evolution and Ecology 106, 114, 111, 110; Biological Sciences 124
Effects of Coastal Pollution on Marine Organisms. Environmental Toxicology/ Nutrition 127
Oceanography. Environmental Science and Policy 152; Geology/Environmental Science and Policy 150C; Biological Sciences 124

Course offerings, sequence structure and instructors may vary from year to year.

Bodega Marine Laboratory spring and summer programs are residential, with students housed on the laboratory grounds. Participants are assessed a room and board fee in addition to standard campus registration fees. Applications and consent of instructors are required.

Additional information is available from the Biological Sciences Undergraduate Programs office in 202 Life Sciences Addition, or directly from:
Bodega Marine Laboratory
P.O. Box 247
Bodega Bay, CA 94923
(707) 875-2211; *http://www.bml.ucdavis.edu/*

Botany

See Plant Biology, on page 456; and Plant Biology (A Graduate Group), on page 458.

Business Management

See Managerial Economics, on page 372, for undergraduate study; and Management, Graduate School of, on page 369.

Cantonese

See Asian American Studies, on page 167.

Cell Biology

See Molecular and Cellular Biology, on page 417.

Cell and Developmental Biology (A Graduate Group)

Kenneth A Beck, Ph.D., Chairperson of the Group
(530) 752-8445

Group Office. 306 Life Sciences
(530) 752-9091;
http://biosci2.ucdavis.edu/ggc/cdb/

Faculty

Peter Armstrong, Ph.D., Professor *(Molecular and Cellular Biology)*
Kenneth A Beck, Ph.D., Associate Professor *(Cell Biology and Human Anatomy)*
Patricia Berger, Ph.D., Professor *(Animal Science)*
Laura Borodinsky, Ph.D., Assistant Professor *(Physiology and Membrane Biology)*
Pete M. Cala, Ph.D., Professor *(Human Physiology)*
Frederic Chedin, Ph.D., Assistant Professor *(Molecular and Cellular Biology)*
Hwai-Jong Cheng, Ph.D., Assistant Professor *(Neurobiology, Physiology, and Behavior)*
James S. Clegg, Ph.D., Professor *(Bodega Marine Laboratory)*
Wenbin Deng, Ph.D., Assistant Professor *(Cell Biology and Human Anatomy)*
Elva Diaz, Ph.D., Assistant Professor *(Medical Pharmacology and Toxicology)*
Gordon Douglas, Ph.D., Adjunct Professor *(Cell Biology and Human Anatomy: MED)*
Bruce Draper, Ph.D., Assistant Professor *(Molecular and Cellular Biology)*
JoAnne Engebrecht, Ph.D., Professor *(Molecular and Cellular Biology)*
Carol Erickson, Ph.D., Professor *(Molecular and Cellular Biology)*
Marilynn E. Etzler, Ph.D., Professor *(Molecular and Cellular Biology)*
Peggy J. Farnham, Ph.D., Professor *(Medical Pharmacology and Toxicology)*
Michael Ferns, Ph.D., Associate Professor *(Human Physiology)*

Andrew Fisher, Ph.D., Professor *(Chemistry)*
Paul G. FitzGerald, Ph.D., Professor
(Cell Biology and Human Anatomy)
J. David Furlow, Ph.D., Associate Professor
(Neurobiology, Physiology, and Behavior)
Angela Gelli, Ph.D., Assistant Professor
(Medical Pharmacology and Toxicology)
Qizhi Gong, Ph.D., Assistant Professor
(Cell Biology and Human Anatomy)
Nobuko Hagiwara, Ph.D., Assistant Professor
(Cardiovascular Medicine)
Bruce Hammock, Ph.D., Professor *(Entomology)*
Academic Senate Distinguished Teaching Award
John H. Harada, Ph.D., Professor *(Plant Biology)*
Academic Senate Distinguished Teaching Award
Jerry L. Hedrick, Ph.D., Professor *(Animal Science)*
Distinguished Graduate Mentoring Award)
Wolf-Dietrich Heyer, Ph.D., Professor *(Microbiology)*
Neil Hunter, Ph.D., Assistant Professor
(Microbiology)
Rivkah Isseroff, Ph.D., Professor *(Dermatology)*
Ken Kaplan, Ph.D., Associate Professor
(Molecular and Cellular Biology)
Paul Knoepfler, Ph.D., Assistant Professor
(Cell Biology and Human Anatomy)
Anne Knowlton, Ph.D., Professor
(Molecular and Cellular Cardiology)
Artyom Kopp, Ph.D., Assistant Professor
(Center of Genetics and Development)
Nancy E. Lane, Ph.D., Professor *(General Medicine)*
Julie A. Leary, Ph.D., Professor
(Molecular and Cellular Biology)
Noelle L'Etoile, Ph.D., Assistant Professor
(Psychiatry)
Ronald Li, Ph.D., Associate Professor
(Cell Biology and Human Anatomy: MED)
Su-Ju Lin, Ph.D., Assistant Professor *(Microbiology)*
Su Hao Lo, Ph.D., Associate Professor
(Ortho Research Labs, UCDMC)
Francis J. McNally, Ph.D., Associate Professor
(Molecular and Cellular Biology)
Jeanette E. Natzle, Ph.D., Associate Professor
(Molecular and Cellular Biology)
Jodi M. Nunnari, Ph.D., Professor
(Molecular and Cellular Biology)
Martha E. O'Donnell, Ph.D., Professor
(Physiology and Membrane Biology)
Paul Primakoff, Ph.D., Professor
(Cell Biology and Human Anatomy)
A. Hari Reddi, Ph.D., Professor
(Ortho Research Labs, UCDMC)
Robert H. Rice, Ph.D., Professor
(Environmental Toxicology)
Lesilee Rose, Ph.D., Associate Professor
(Molecular and Cellular Biology)
Jonathan M. Scholey, Ph.D., Professor
(Molecular and Cellular Biology)
Dan Starr, Ph.D., Assistant Professor
(Molecular and Cellular Biology)
Colleen Sweeney, Ph.D., Associate Professor
(Cancer Center, Basic Science)
Fern Tablin, V.M.D., Ph.D., Professor
(Anatomy, Physiology and Cell Biology)
Alice Tarantal, Ph.D., Professor
(Cell Biology and Human Anatomy)
James S. Trimmer, Ph.D., Professor
(Medical Pharmacology and Toxicology)
Richard P. Tucker, Ph.D., Professor
(Cell Biology and Human Anatomy)
Judith L. Turgeon, Ph.D., Professor
(Human Physiology)
Robert H. Weiss, M.D., Professor
(Internal Medicine)
Matthew Wood, Ph.D., Assistant Professor
(Environmental Toxicology)
Reen Wu, Ph.D., Professor
(Pulmonary/Critical Care Medicine)
Soichiro Yamada, Ph.D., Assistant Professor
(Biomedical Engineering)
Clare E. Yellowley, Ph.D., Professor
(VM: Anatomy, Physiology and Cell Biology)
Chengji Zhou, Ph.D., Assistant Professor
(Cell Biology and Human Anatomy: MED)
Karen Zito, Ph.D., Assistant Professor
(Neurobiology, Physiology, and Behavior)

Graduate Study. The Graduate Group in Cell and Developmental Biology offers programs of study leading to the M.S. and Ph.D. degrees. Cell and Developmental Biology is a broad interdepartmental program. The curriculum consists of core courses in cell biology or developmental biology as well as courses jointly staffed with other graduate programs. Specific programs of study are decided upon by an advisory committee chaired by the student's research adviser, and the choice of major core courses will reflect the student's primary research interest.

Preparation. Appropriate preparation is an undergraduate degree in a biological or physical science. Preparation should include a year of calculus, physics, general chemistry and organic chemistry, and introductory courses in statistics, biochemistry, genetics and cell biology.

Graduate Advisers. F. McNally, E. Diaz, R. Tucker

Courses in Cell and Developmental Biology (CDB)

Graduate Courses

200. Current Techniques in Cell Biology (2)
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 104 and Molecular and Cellular Biology 141 or the equivalent courses. Current techniques used in cell biology research including microscopy, spectroscopy, electrophysiology, immunochemistry, histology, organelle isolation, calorimetry, tissue culture and gel electrophoresis. Lectures are presented by experts on each technique, with an emphasis on pitfalls to avoid when using the technique. (Same course as Molecular and Cellular Biology 200A.) (S/U grading only.)—I. (I.) Beck

200LA. Cell and Developmental Biology Laboratory (3)
Laboratory—18 hours. Prerequisite: course 200 (may be taken concurrently). One five-week assignment in the research laboratory of a Cell and Developmental Biology Graduate Group member. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit four times.—I, II, III. (I, II, III.)

200LB. Cell and Developmental Biology Laboratory (6)
Laboratory—18 hours. Prerequisite: course 200 (may be taken concurrently). Two five-week assignments in research laboratories of Cell and Developmental Biology Graduate Group members. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit.—I, II, III. (I, II, III.)

205. Topics in Cell Biology of the Cytoskeleton (2)
Lecture—0.4 hours; discussion—1 hour; seminar—0.6 hours. Prerequisite: graduate standing. Roles of individual proteins in regulating the organization and function of the actin, microtubule and intermediate filament cytoskeletal systems. Emphasis on primary literature. Topics may vary. May be repeated for credit when topic differs.—I. (I.) McNally

290. Current Topics in Cell and Developmental Biology (1)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by guest lecturers describing their research activities. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Research Conference in Cell and Developmental Biology (1)
Discussion—1 hour. Prerequisite: graduate standing in Cell and Developmental Biology and/or consent of instructor; course 299 concurrently. Presentation and discussion of faculty and graduate-student research in cell and developmental biology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Cell Biology and Human Anatomy

See Medicine, School of, on page 380.

Chemistry

(College of Letters and Science)

Carlito B.Lebrilla, Ph.D., Chairperson of the Department

Neil E. Schore, Ph.D., Vice-Chairperson of the Department

Mark Kurth, Ph.D. Vice-Chairperson of the Department

Department Office. 108 Chemistry Building
(530) 754-9425/752-0503/752-0953;
Fax (530) 752-8995;
http://www.chem.ucdavis.edu

Faculty

Toby Allen, Ph.D, Associate Professor
James Ames, Ph.D., Associate Professor
Shota Atsumi, Ph.D., Assistant Professor
Matthew P. Augustine, Ph.D., Associate Professor
Alan L. Balch, Ph.D., Professor
Enoch Baldwin, Ph.D. Associate Professor
Peter Beal, Ph.D., Professor
Louise A. Berben, Ph.D., Assistant Professor
R. David Britt, Ph.D., Professor
William Casey, Ph.D., Professor
Xi Chen, Ph.D., Associate Professor
Sheila David, Ph.D., Professor
Andrew J. Fisher, Ph.D., Professor
Annaliese K, Franz, Ph.D., Assistant Professor
Giulia Galli, Ph.D., Professor
Jacquelyn Gervay Hague, Ph.D., Professor
Ting Guo, Ph.D., Associate Professor
Susan M. Kauzlarich, Ph.D., Professor
Distinguished Graduate Mentoring Award
Peter B. Kelly, Ph.D., Professor
Mark J. Kurth, Ph.D., Professor
Donald P. Land, Ph.D., Associate Professor
Delmar Larsen, Ph.D., Assistant Professor
Carlito B. Lebrilla, Ph.D., Professor
Gang-Yu Liu, Ph.D., Professor
C. William McCurdy, Ph.D., Professor
Mark Mascal, Ph.D., Associate Professor
Claude F. Meares, Ph.D., Professor
Distinguished Graduate Mentoring Award
Krishnan P. Nambiar, Ph.D., Associate Professor
Distinguished Graduate Mentoring Award
Alexandra Navrotsky, Ph.D., Professor
Cheuk-Yiu Ng, Ph.D., Professor
Marilyn Olmstead, Ph.D., Professor
Frank Osterloh, Ph.D., Associate Professor
Timothy E. Patten, Ph.D., Professor
Philip P. Power, FRS, Ph.D., Professor
Neil E. Schore, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Jared T. Shaw, Ph.D., Assistant Professor
Alexei P. Stuchebrukhov, Ph.D., Professor
Dean Tantillo, Ph.D., Associate Professor
Michael Toney, Ph.D., Professor
Nancy S. True, Ph.D., Professor
Fred E. Wood, Ph.D., Senior Lecturer

Emeriti Faculty

Thomas L. Allen, Ph.D., Professor Emeritus
W. Ronald Fawcett, Ph.D., Professor Emeritus
William H. Fink, Ph.D., Professor, Emeritus
Edwin Friedrich, Ph.D., Professor Emeritus
Hakon Hope, Cand. Real., Professor Emeritus
William M. Jackson, Ph.D., Professor Emeritus

Raymond M. Keefer, Ph.D., Professor Emeritus
Gerd N. LaMar, Ph.D., Professor Emeritus
W. Kenneth Musker, Ph.D., Professor Emeritus
Carl W. Schmid, Ph.D., Professor, Emeritus
James H. Swinehart, Ph.D., Professor Emeritus
Dino S. Tinti, Ph.D., Professor, Emeritus
George S. Zweifel, Sc.D., Professor Emeritus

The Major Programs

Chemistry studies the composition of matter, its structure, and the means by which it is converted from one form to another.

The Program. The Department of Chemistry offers several degree programs leading to the Bachelor of Arts and the Bachelor of Science. The curriculum leading to the A.B. degree offers a substantive program in chemistry while allowing students the freedom to take more courses in other disciplines and pursue a broad liberal arts education. Students who have a deeper interest in chemistry normally elect one of the several programs leading to the B.S. degree. The standard B.S. program, which is accredited by the American Chemical Society, is appropriate for students who are interested in chemistry as a profession. The other B.S. programs provide emphasis in four areas of applied chemistry: chemical physics, environmental chemistry, forensic chemistry, and pharmaceutical chemistry. These emphases are slightly less intense in chemistry, and draw on significant course materials from areas that are relevant to the particular emphasis but outside of a classical chemistry degree. Students following the A.B or one of the B.S. programs may consider taking advantage of the Education Abroad Program. Faculty advisors can assist students in planning a curriculum while abroad that assures regular progress in the major. A minor program in chemistry is also available.

Career Alternatives. Chemistry graduates with bachelor's degrees are employed extensively throughout various industries in quality control, research and development, production supervision, technical marketing, and other areas. The types of industries employing these graduates include chemical, energy, pharmaceutical, genetic engineering, biotechnology, food and beverage, petroleum and petrochemical, paper and textile, electronics and computer, and environmental and regulatory agencies. The bachelor's programs also provide chemistry graduates with the rigorous preparation needed for an advanced degree in chemistry and various professional schools in the health sciences.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 36-42
- Chemistry 2A-2B-2C or 2AH-2BH-2CH 15
- Physics 7A-7B-7C or 9A-9B-9C 12-15
- Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C 9-12

Depth Subject Matter 43
- Chemistry 105, 110A-110B-110C, 124A, 128A-128B-128C-129A-129B 32
- At least 11 additional upper division units in chemistry (except Chemistry 107A or 107B) or related areas, including one course with formal lectures. Courses in related areas must be approved in advance by the major adviser 11

Total Units for the Major 79-85

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 53
- Chemistry 2A-2B-2C or 2AH-2BH-2CH 15
- Physics 9A, 9B, 9C 15
- Mathematics 21A, 21B, 21C, 21D, 22A, 22AL, 22B 23

Depth Subject Matter 54
- Chemistry 105, 110A, 110B, 110C, 115, 124A, 124B or 124C, 124L, 125, 128A, 128B, 128C, 129A, 129B, 129C 47
- At least 7 additional upper division units in chemistry (except Chemistry 107A, 107B), including one course with formal lectures 7

Total Units for the Major 107

Recommended
- Physics 9D

Applied Chemistry—Chemical Physics Emphasis

UNITS

Preparatory Subject Matter 57
- Chemistry 2A-2B-2C or 2AH-2BH-2CH 15
- Physics 9A, 9B, 9C, 9D 19
- Mathematics 21A, 21B, 21C, 21D, 22A, 22AL, 22B 23

Depth Subject Matter 53
- Chemistry 105, 110A, 110B, 110C, 115, 124A, 125, 128A, 128B, 129A 35
- Physics 104A, 105A, 110A 12
- At least one course from Physics 105B, 110B, 112, 115A, 140A 4
- At least 2 additional upper division units in chemistry (except Chemistry 107A, 107B) 2

Total Units for the Major 110

Applied Chemistry—Environmental Chemistry Emphasis

UNITS

Preparatory Subject Matter 43-50
- Chemistry 2A-2B-2C or 2AH-2BH-2CH 15
- Physics 7A, 7B, 7C or 9A-9B-9C 12-15
- Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C 9-12
- Biological Sciences 2A 4
- Statistics 13 or 32 or 100 3-4

Depth Subject Matter 53-62
- Chemistry 100, 105, 115, 124A 14
- Chemistry 107A-107B or 110A-110B-110C 6-12
- Chemistry 118A-118B-118C or 128A-128B-128C-129A-129B 12-13
- Environmental Science and Policy 110 4
- Environmental Toxicology 101 4
- At least three courses from Atmospheric Science 160; Environmental Science and Policy 151; Environmental Toxicology 102A, 102B, 120, 131, 135, 146; Geology 150A; Soil Science 111 9-13
- At least 3 additional upper division units in chemistry (Chemistry 199 or 194H strongly encouraged) 3

Total Units for the Major 95-113

Applied Chemistry—Forensic Chemistry Emphasis:

UNITS

Preparatory Subject Matter 47-54
- Chemistry 2A-2B-2C or 2AH-2BH-2CH 15
- Physics 7A-7B-7C or 9A-9B-9C 12-15
- Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C 9-12
- Biological Sciences 2A 4
- Environmental Toxicology 20 4
- Statistics 13, 32, 100 or 102 3-4

Depth Subject Matter 51-61
- Chemistry 104, 105, 115 29-36
- Chemistry 107A-107B or 110A-110B-110C 6-12
- Chemistry 118A-118B-118C or 128A-128B-128C-129A-129B 12-13
- Environmental Toxicology 101, 102A, 102B 13
- At least two courses from Biological Sciences 101; Environmental Science and Policy 161; Environmental Toxicology 103A, 103B, 111, 135, 138; Statistics 108, 130A 6-9
- At least 3 additional upper division units in chemistry (Chemistry 199 or 194H strongly encouraged) 3

Total Units for the Major 98-115

Applied Chemistry—Pharmaceutical Chemistry Emphasis

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 48-55
- Chemistry 2A-2B-2C or 2AH-2BH-2CH 15
- Physics 7A, 7B, 7C or 9A-9B-9C 12-15
- Mathematics 16A-16B-16C or 17A-17B-17C or 21A-21B-21C 9-12
- Biological Sciences 2A, and 2B or 2C 9
- Statistics 13, 32 or 100 3-4

Depth Subject Matter 48-64
- Chemistry 124A, 130A-130B-135, 150 15
- Chemistry 107A-107B or 110A-110B-110C 6-12
- Chemistry 118A-118B-118C or 128A-128B-128C-129A-129B-129C 12-15
- Biological Sciences 102 or Chemistry 131 3
- At least four courses (not used to satisfy the above requirements) from Biological Sciences 102, 103, Biotechnology 171 or Veterinary Medicine 170, Chemistry 131, 199 (minimum 3 units) or 194H, Environmental Toxicology 103A, Microbiology 102, Neurobiology, Physiology, and Behavior 100, 101, Plant Biology 126, 130 12-19

Total Units for the Major 96-119

Major Adviser. Aaron Morrison, 125 Chemistry Building

Minor Program Requirements:

UNITS

Chemistry 20-21
- Chemistry 105, 107A, 107B, 118A, 124A 17
- At least one additional course from Chemistry 118B, 124B and 124C 3-4

Note: The minor program has prerequisites of Chemistry 2A-2B-2C, Mathematics 16A-16B-16C, and Physics 7A-7B-7C or their equivalents. Students wishing to earn a Chemistry minor should consult with a Chemistry major adviser.

Honors and Honors Program. The student must take courses 194HA, 194HB, and 194HC.

Graduate Study. The Department of Chemistry offers programs of study and research leading to the M.S. and Ph.D. degrees in Chemistry. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Chemistry. See also Graduate Studies, on page 109.

Courses in Chemistry (CHE)

Diagnostic Examinations. To enroll in Chemistry 2A or 2AH, all students (including those with Advanced Placement examination credit or transfer units for any courses in chemistry or mathematics) must pass both the *Chemistry Diagnostic Test* and the *Precalculus Diagnostic Examination with satisfactory scores*. Both exams are administered during Summer Advising and Orientation and during the orientation week of any quarter in which Chemistry 2A or 2AH is offered. Students who have not passed both exams will be administratively dropped from Chemistry 2A and 2AH.

Students who have scored *(1)* 5 on the College Board Advanced Placement (AP) Exam in Chemistry or *(2)* 7 on the International Baccalaureate Higher

Level Exam in Chemistry as recorded in their application file are not required to take the Chemistry Diagnostic Test. Students who have scored *(1)* 4 or 5 on the AP Mathematics AB exam or *(2)* 3, 4 or 5 on the AP Mathematics BC exam or *(3)* 700 or above on the mathematics section of the SAT Reasoning Test or *(4)* 700 or above on the SAT Mathematics Subject Test (Level 1 or Level 2) as recorded in their application file are not required to take the Precalculus Qualifying Exam. All other students must take both exams.

If you do not achieve a satisfactory score on the Chemistry Diagnostic Test, you have two options. First, you may retake the test. The Learning Skills Center will provide you with the results of your test and details regarding self-directed study materials you may use to prepare to retake the test. The second option is to enroll in and achieve a passing grade (P or C or better) Sacramento City College's Chemistry 110C (listed in the *Class Schedule and Registration Guide* as WLD 041C before the Chemistry courses). This course is given at UC Davis during fall quarter specifically for UC Davis students who require extra preparation for Chemistry 2A. WLD 41C provides 3 units of credit toward minimum progress and verification of full-time status, but provides **no units toward graduation or grade point average**. You may not enroll in WLD 41C if you have passed the Chemistry Diagnostic Test or if you have not yet taken the Chemistry Diagnostic Test.

Lower Division Courses

2A. General Chemistry (5)
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: High school chemistry and physics strongly recommended; satisfactory score on diagnostic examinations. Periodic table, stoichiometry, chemical equations, physical properties and kinetic theory of gases, atomic and molecular structure and chemical bonding. Laboratory experiments in stoichiometric relations, properties and collection of gases, atomic spectroscopy, and introductory quantitative analysis. Only 3 units of credit allowed to students who have completed course 9. GE credit: SciEng.—I, II. (I, II.)

2AH. Honors General Chemistry (5)
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: High school chemistry and physics; satisfactory score on diagnostic examinations; Mathematics 21A (may be taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2A. Students completing course 2AH can continue with course 2BH or 2B.—I. (I.)

2B. General Chemistry (5)
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: course 2A or 2AH. Continuation of course 2A. Condensed phases and intermolecular forces, chemical thermodynamics, chemical equilibria, acids and bases, solubility. Laboratory experiments in thermochemistry, equilibria, and quantitative analysis using volumetric methods. GE credit: SciEng.—II, III. (II, III.)

2BH. Honors General Chemistry (5)
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: course 2A with consent of instructor or course 2AH with a grade of C or better; and Mathematics 21B (maybe taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2B. Students completing course 2BH can continue with course 2CH or 2C.—II. (II.)

2C. General Chemistry (5)
Lecture—3 hours; laboratory/discussion—4 hours. Prerequisite: course 2B or 2BH. Continuation of course 2B. Kinetics, electrochemistry, spectroscopy, structure and bonding in transition metal compounds, application of principles to chemical reactions. Laboratory experiments in selected analytical methods and syntheses. GE credit: SciEng.—I, III. (I, III.)

2CH. Honors General Chemistry (5)
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2B with consent of instructor or course 2BH with a grade of C or better; and Mathematics 21C (maybe taken concurrently) or consent of instructor. Limited enrollment course with a more rigorous treatment of material covered in course 2C.—III. (III.)

8A. Organic Chemistry: Brief Course (2)
Lecture—2 hours. Prerequisite: course 2B with a grade of C– or higher. With course 8B, an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than organic chemistry.—I, III. (I, III.)

8B. Organic Chemistry: Brief Course (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 8A or 118A. Continuation of course 8A. Laboratory concerned primarily with organic laboratory techniques and the chemistry of the common classes of organic compounds.—I, II. (I, II.)

10. Concepts of Chemistry (4)
Lecture—4 hours. A survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 2A. Course Not open for credit to students who have had Chemistry 2A; but students with credit for course 10 may take Chemistry 2A for full credit. GE credit: SciEng, Wrt.—I. (I.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Environmental Water Chemistry (3)
Lecture—3 hours. Prerequisite: course 2C. Practical aspects of water chemistry in the environment, including thermodynamic relations, coordination chemistry, solubility calculations, redox reactions and rate laws. Computer modeling of the evolution in water chemistry from contact with minerals and gases.—II. (II.) Casey

104. Forensic Applications of Analytical Chemistry (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 2C. Theory and application of standard methods of chemical analysis to evidentiary samples. Use and evaluation of results from screening tests, FTIR, GC and GCMS to various sample types encountered in forensics.—I. (I.) Land

105. Analytical and Physical Chemical Methods (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110A (may be taken concurrently) or courses 107A-107B. Fundamental theory and laboratory techniques in analytical and physical chemistry. Errors and data analysis methods. Basic electrical circuits in instruments. Advanced solution equilibria. Potentiometric analysis. Chromatographic separations. UV-visible spectroscopy. Lasers.—I, III. (I, III.)

107A. Physical Chemistry for the Life Sciences (3)
Lecture—3 hours. Prerequisite: course 2C, Mathematics 16C or 21C, one year of college level physics. Physical chemistry intended for majors in the life science area. Introductory development of classical and statistical thermodynamics including equilibrium processes and solutions of both non-electrolytes and electrolytes. The thermodynamic basis of electrochemistry and membrane potentials.—I. (I.)

107B. Physical Chemistry for the Life Sciences (3)
Lecture—3 hours. Prerequisite: course 107A. Continuation of course 107A. Kinetic theory of gases and transport processes in liquids. Chemical kinetics, enzyme kinetics and theories of reaction rates. Introduction to quantum theory, atomic and molecular structure, and spectroscopy. Application to problems in the biological sciences.—II. (II.)

108. Physical Chemistry of Macromolecules (3)
Lecture—3 hours. Prerequisite: course 107B or 110C. Physical properties and characterization of macromolecules with emphasis upon those of biological interest. Structural thermodynamic, optical and transport properties of polymers in bulk and in solution. Physical characterization methods. Special topics on the properties of polyelectrolyte systems.—III. (III.)

110A. Physical Chemistry: Introduction to Quantum Mechanics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2C, Mathematics 16C or 21C; one year of college physics. Introduction to the postulates and general principles of quantum mechanics. Approximations based on variational method and time independent perturbation theory. Application to harmonic oscillator, rigid rotor, one-electron and many-electron atoms, and homo-and hetero-nuclear diatomic molecules.—I, III. (I, III.)

110B. Physical Chemistry: Properties of Atoms and Molecules (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110A. Group theory. Application of quantum mechanics to polyatomic molecules and molecular spectroscopy. Intermolecular forces and the gas, liquid and solid states. Distributions, ensembles and partition functions. Transport properties.—I, II. (I, II.)

110C. Physical Chemistry: Thermodynamics, Equilibria and Kinetics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B. Development and application of the general principles of thermodynamics and statistical thermodynamics. Chemical kinetics, rate laws for chemical reactions and reaction mechanisms.—II, III. (II, III.)

115. Instrumental Analysis (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 105 and 110B (may be taken concurrently) or 107A-107B. Intermediate theory and laboratory techniques in analytical and physical chemistry. Advanced data analysis methods and goodness-of-fit criteria. Fouriertransform spectroscopic methods and instrumentation. Mass spectrometry. Electrochemistry. Liquid chromatography. GE credit: Wrt.—I, II. (I, II.)

118A. Organic Chemistry for Health and Life Sciences (4)
Lecture—3 hours; laboratory/discussion—1.5 hours. Prerequisite: course 2C with a grade of C– or higher. The 118A, 118B, 118C series is for students planning professional school studies in health and life sciences. A rigorous, in-depth presentation of basic principles with emphasis on stereochemistry and spectroscopy and preparations and reactions of nonaromatic hydrocarbons, haloalkanes, alcohols and ethers.—I, II, III. (I, II, III.)

118B. Organic Chemistry for Health and Life Sciences (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 118A. Continuation of course 118A, with emphasis on spectroscopy and the preparation and reactions of aromatic hydrocarbons, organometallic compounds, aldehydes and ketones.—I, II, III. (I, II, III.)

118C. Organic Chemistry for Health and Life Sciences (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 118B. Continuation of course 118B, with emphasis on the preparation, reactions and identification of carboxylic acids and their derivatives, alkyl and acyl amines, ß-dicarbonyl compounds, and various classes of naturally occurring, biologically important compounds.—I, II, III. (I, II, III.)

121. Introduction to Molecular Structure and Spectra (4)
Lecture—4 hours. Prerequisite: course 110B. Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques.—III. (III.)

122. Chemistry of Nanoparticles (3)
Lecture—3 hours. Prerequisite: course 110C (may be taken concurrently). Chemical and physical aspects of inorganic nanoparticles. Topics include synthesis, structure, colloidal behavior, catalytic activity, size and shape dependency of physical properties, analytical methods and applications.—III. (III.) Osterloh

124A. Inorganic Chemistry: Fundamentals (3)
Lecture—3 hours. Prerequisite: course 2C. Symmetry, molecular geometry and structure, molecular orbital theory of bonding (polyatomic molecules and transition metals), solid state chemistry, energetics and spectroscopy of inorganic compounds.—I. (I.)

124B. Inorganic Chemistry: Main Group Elements (3)
Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of inorganic and heteroorganic molecules containing the main group elements.—II. (II.)

124C. Inorganic Chemistry: d and f Block Elements (3)
Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of transition metal complexes, organometallic and bioinorganic chemistry, the lanthanides and actinides.—III. (III.)

124L. Laboratory Methods in Inorganic Chemistry (2)
Laboratory—6 hours. Prerequisite: course 124B or 124C (may be taken concurrently). The preparation, purification and characterization of main group and transition metal inorganic and organometallic compounds.—III. (III.)

125. Advanced Methods in Physical Chemistry (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110C (may be taken concurrently) and 115. Advanced theory and laboratory techniques in analytical and physical chemistry. Advanced spectroscopic methods. Thermodynamics. Kinetics. Chemical literature. Digital electronics and computer interfacing. Laboratory measurements and vacuum techniques. GE credit: Wrt.—II, III. (II, III.)

128A. Organic Chemistry (3)
Lecture—3 hours. Prerequisite: course 2C with a grade of C or higher; chemistry majors should enroll in course 129A concurrently. Introduction to the basic concepts of organic chemistry with emphasis on stereochemistry and the chemistry of hydrocarbons. Designed primarily for majors in chemistry.—I, II. (I, II.)

128B. Organic Chemistry (3)
Lecture—3 hours. Prerequisite: course 128A or consent of instructor, course 129A strongly recommended; chemistry majors should enroll in course 129B concurrently. Continuation of course 128A with emphasis on aromatic and aliphatic substitution reactions, elimination reactions, and the chemistry of carbonyl compounds. Introduction to the application of spectroscopic methods to organic chemistry.—II, III. (II, III.)

128C. Organic Chemistry (3)
Lecture—3 hours. Prerequisite: course 128B, chemistry majors should enroll in course 129C concurrently. Continuation of course 128B with emphasis on enolate condensations and the chemistry of amines, phenols, and sugars; selected biologically important compounds.—I, III. (I, III.)

129A. Organic Chemistry Laboratory (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2C with a grade of C or higher; course 128A (may be taken concurrently). Introduction to laboratory techniques of organic chemistry. Emphasis is on methods used for separation and purification of organic compounds.—I, II. (I, II.)

129B. Organic Chemistry Laboratory (2)
Laboratory—6 hours. Prerequisite: courses 128B (may be taken concurrently) and 129A. Continuation of course 129A. Emphasis is on methods used for synthesis and isolation of organic compounds.—II, III. (II, III.)

129C. Organic Chemistry Laboratory (2)
Laboratory—6 hours. Prerequisite: courses 128C (may be taken concurrently) and 129B. Continuation of course 129B.—I, III. (I, III.)

130A. Pharmaceutical Chemistry (3)
Lecture—3 hours. Prerequisite: course 118C or 128C. Examination of the design principles and experimental methods used in pharmaceutical and medicinal chemistry.—II. (II.)

130B. Pharmaceutical Chemistry (3)
Lecture—2 hours; lecture/laboratory—1 hours. Prerequisite: course 130A. Continuation of course 130A with emphasis on case studies of various drugs and the use of computational methods in drug design.—III. (III.)

131. Modern Methods of Organic Synthesis (3)
Lecture—3 hours. Prerequisite: course 128C. Introduction to modern synthetic methodology in organic chemistry with emphasis on stereoselective reactions and application to multistep syntheses of organic molecules containing multifunctionality.—II. (II.)

135. Advanced Bio-organic Chemistry Laboratory (3)
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 118C or 129C. Separation, purification, identification and biological evaluation of organic compounds using modern methods of synthesis, computational chemistry and instrumentation. Emphasis on pharmaceutical and medicinal substances.—III. (III.)

150. Chemistry of Natural Products (3)
Lecture—3 hours. Prerequisite; course 128C. Chemistry of terpenes, steroids, acetogenins, and alkaloids: isolation, structure determination, biosynthesis, chemical transformations, and total synthesis. GE credit: SciEng, Wrt.—I. (I.)

192. Internship in Chemistry (1-6)
Internship—3-18 hours. Prerequisite: upper division standing; project approval by faculty sponsor prior to enrollment. Supervised internship in chemistry; requires a final written report. May be repeated for credit for a total of 6 units. (P/NP grading only.)

194HA-194HB-194HC. Undergraduate Honors Research (2-2-2)
Independent study—2 hours. Prerequisite: open only to chemistry majors who have completed 135 units and who qualify for the honors program. Original research under the guidance of a faculty adviser, culminating in the writing of an extensive report. (Deferred grading only, pending completion of sequence.)

195. Careers in Chemistry (1)
Seminar—2 hours. Prerequisite: junior or senior standing in Chemistry. Designed to give Chemistry undergraduate students an in-depth appreciation of career opportunities with a bachelors degree in chemistry. Professional chemists (and allied professionals) describe research and provide career insights. (P/NP grading only.)—I.

197. Projects in Chemical Education (1-4)
Discussion and/or laboratory. Prerequisite: consent of instructor. Participation may include development of laboratory experiments, lecture demonstrations, autotutorial modules or assistance with laboratory sessions. May be repeated for credit for a total of 12 units. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics and physics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.)

Graduate Courses

201. Chemical Uses of Symmetry and Group Theory (3)
Lecture—3 hours. Prerequisite: course 124A and 110B, or consent of instructor. Symmetry elements and operations, point groups, representations of groups. Applications to molecular orbital theory, ligand field theory, molecular vibrations, and angular momentum. Crystallographic symmetry.—I. (I.)

204. Mathematical Methods in Chemistry (3)
Lecture—3 hours. Prerequisite: course 110C; graduate standing in Chemistry. Introduction to mathematical and numerical methods in chemistry. Real and complex functions. Methods of integration. Differential equations. Linear algebra and matrices. Special functions. Integral transforms. Statistics.—I. (I.)

205. Symmetry, Spectroscopy, and Structure (3)
Lecture—3 hours. Prerequisite: course 201 or the equivalent. Vibrational and rotational spectra; electronic spectra and photoelectron spectroscopy; magnetism; electron spin and nuclear quadrapole resonance spectroscopy; nuclear magnetic resonance spectroscopy; other spectroscopic methods.—II. (II.)

209. Special Topics in Physical Chemistry (3)
Lecture—3 hours. Prerequisite: courses 210A and 211A; graduate standing in Chemistry. Advanced topics in physical chemistry, biophysical chemistry or chemical physics chosen from areas of current research interest. May be repeated for credit.

210A. Quantum Chemistry: Introduction and Stationary-State Properties (3)
Lecture—3 hours. Prerequisite: course 110B and 110C or consent of instructor. Stationary-state quantum chemistry: postulates of quantum mechanics, simple solutions, central field problems and angular momenta, hydrogen atom, perturbation theory, variational theory, atoms and molecules.—II. (II.)

210B. Quantum Chemistry: Time-Dependent Systems (3)
Lecture—3 hours. Prerequisite: course 210A. Matrix mechanics and time-dependent quantum chemistry: matrix formulation of quantum mechanics, Heisenberg representation, time-dependent perturbation theory, selection rules, density matrices, and miscellaneous molecular properties.—III. (III.)

210C. Quantum Chemistry: Molecular Spectroscopy (3)
Lecture—3 hours. Prerequisite: course 210B. Molecular spectroscopy: Born-Oppenheimer approximation, rotational, vibrational and electronic spectroscopy, spin systems, and molecular photophysics.—I. (I.)

211A. Advanced Physical Chemistry: Statistical Thermodynamics (3)
Lecture—3 hours. Prerequisite: consent of instructor. Principles and applications of statistical mechanics; ensemble theory; statistical thermodynamics of gases, solids, liquids, electrolyte solutions and polymers; chemical equilibrium.—I. (I.)

211B. Statistical Mechanics (3)
Lecture—3 hours. Prerequisite: course 211A. Statistical mechanics of nonequilibrium systems, including the rigorous kinetic theory of gases, continuum mechanics transport in dense fluids, stochastic processes, brownian motion and linear response theory. Offered in alternate years.—II.

212. Chemical Dynamics (3)
Lecture—3 hours. Prerequisite: consent of instructor. Introduction to modern concepts in chemical reaction dynamics for graduate students in chemistry. Emphasis will be placed on experimental techniques as well as emerging physical models for characterizing chemical reactivity at a microscopic level. Offered in alternate years.—II.

215. Theoretical and Computational Chemistry (3)
Lecture—3 hours. Prerequisite: courses 211A and 210B or consent of instructor. Mathematics of wide utility in chemistry, computational methods for guidance or alternative to experiment, and modern formulations of chemical theory. Emphasis will vary in successive years. May be repeated for credit when topic differs. Offered in alternate years.—(III.)

216. Magnetic Resonance Spectroscopy (3)
Lecture—3 hours. Prerequisite: courses 210A, 210B (may be taken concurrently). Quantum mechanics of spin and orbital angular momentum, nuclear magnetic resonance, theory of chemical shift and multiplet structures, electron spin resonance, theory of g-tensor in organic and transition ions, spin Hamiltonians, nuclear quadrupolar resonance, spin relaxation processes. Offered in alternate years.—(III.)

217. X-Ray Structure Determination (3)
Lecture—3 hours. Prerequisite: consent of instructor. Introduction to x-ray structure determination; crystals, symmetry, diffraction geometry, sample preparation and handling, diffraction apparatus and data collection, methods of structure solution and refinement, presentation of results, text, tables and graphics, crystallographic literature.—III. (III.)

218. Macromolecules: Physical Principles (3)
Lecture—3 hours. Prerequisite: courses 110A, 110B, 110C or the equivalent. Relationship of higher order macromolecular structure to subunit composition; equilibrium properties and macromolecular dynamics; physical chemical determination of macromolecular structure. Offered in alternate years.—I.

219. Spectroscopy of Organic Compounds (4)
Lecture—3 hours; laboratory—2.5 hours. Prerequisite: course 128C or the equivalent. Identification of organic compounds and investigation of stereochemical and reaction mechanism phenomena using spectroscopic methods—principally NMR, IR and MS.—II. (II.)

219L. Laboratory in Spectroscopy of Organic Compounds (1)
Laboratory—2.5 hours. Prerequisite: course 219 (may be taken concurrently). Restricted to Chemistry graduate students only (or consent of instructor). Practical application of NMR, IR and MS techniques for organic molecules.—III. (III.)

221A-H. Special Topics in Organic Chemistry (3)
Lecture—3 hours. Selected topics of current interest in organic chemistry. Topics will vary each time the course is offered, and in general will emphasize the research interests of the staff member giving the course.—I. (I.)

222. Chemistry of Nanoparticles (3)
Lecture/discussion—3 hours. Prerequisite: course 110C or equivalent. Chemical and physical aspects of inorganic nanoparticles, including synthesis, purification, reactivity, characterization, and applications for technology. Emphasis is on problems from the current literature. Not open for credit to students who have taken course 122.—III. (III.) Osterloh

226. Principles of Transition Metal Chemistry (3)
Lecture—3 hours. Prerequisite: course 124A or the equivalent. Electronic structures, bonding, and reactivity of transition metal compounds.—I. (I.) Balch

228A. Bio-inorganic Chemistry (3)
Lecture—3 hours. Prerequisite: course 226 or consent of instructor. Defines role of inorganic chemistry in the functioning of biological systems by identifying the functions of metal ions and main group compounds in biological systems and discussing the chemistry of model and isolated biological compounds. Offered every third year.

228B. Main Group Chemistry (3)
Lecture—3 hours. Prerequisite: course 226 or consent of instructor. Synthesis, physical properties, reactions and bonding of main group compounds. Discussions of concepts of electron deficiency, hypervalency, and non-classical bonding. Chemistry of the main group elements will be treated systematically. Offered every third year.—III.

228C. Solid-State Chemistry (3)
Lecture—3 hours. Prerequisite: courses 124A, 110B, 226, or the equivalent. Design and synthesis, structure and bonding of solid-state compounds; physical properties and characterization of solids; topics of current interest such as low-dimensional materials, inorganic polymers, materials for catalysis. Offered every third year.—III.

228D. Homogeneous Catalysis (3)
Lecture—3 hours. Prerequisite: course 226. Overview of homogeneous catalysis and related methods, with emphasis on kinetics, mechanisms, and applications for organic synthesis. The related methods may include cluster, colloid, phase transfer, enzymatic, heterogeneous and polymer-supported catalysis. Offered in alternate years.—III.

231A. Organic Synthesis: Methods and Strategies (4)
Lecture—3 hours; lecture/discussion—3 hours. Prerequisite: course 128C or equivalent. Current strategies and methods in synthetic organic chemistry. Focus on construction of carbon frameworks, control of relative and absolute stereochemistry and retrosynthetic strategies. Use of databases and molecular modeling software in multistep strategies. Only one unit of credit for students who have completed course 131. Not open for credit to students who have taken course 231.—II. (II.)

231B. Advanced Organic Synthesis (3)
Lecture—3 hours. Prerequisite: course 231A. Current strategies and methods in synthetic organic chemistry. Continuation of course 231A. Organic synthesis of complex target molecules. Stereochemical considerations and asymmetric synthesis. Organometallics for selective transformations. Carbocyclic and heterocyclic ring formation. Not open for credit to students who have taken course 231.—III. (III.)

233. Physical-Organic Chemistry (3)
Lecture—3 hours. Prerequisite: courses 128A-128B-128C and 110A-110B-110C or the equivalent. Introduction to elementary concepts in physical-organic chemistry including the application of simple numerical techniques in characterizing and modeling organic reactions.—I. (I.)

235. Organometallic Chemistry in Organic Synthesis (3)
Lecture—3 hours. Prerequisite: course 128C. Current trends in use of organometallics for organic synthesis; preparations, properties, applications, and limitations of organometallic reagents derived from transition and/or main group metals. Offered in alternate years.—(III.)

236. Chemistry of Natural Products (3)
Lecture—3 hours. Prerequisite: course 128C or the equivalent. Advanced treatment of chemistry of naturally occurring compounds isolated from a variety of sources. Topics will include isolation, structure determination, chemical transformations, total synthesis, biological activity, and biosynthesis. Biosynthetic origin will be used as a unifying theme.—II. (II.)

237. Bio-organic Chemistry (3)
Lecture—3 hours. Prerequisite: course 128C or the equivalent. Structure and function of biomolecules; molecular recognition; enzyme reaction mechanisms; design of suicide substrates for enzymes; enzyme engineering; design of artificial enzymes and application of enzymes in organic synthesis. Offered in alternate years.—(I.)

238. Introduction to Chemical Biology (3)
Lecture—3 hours. Prerequisite: course 118C or 128C, or the equivalent; course 130A & B and Biological Sciences 102, 103, & 104, or the equivalents recommended. Synthesis of complex molecules in nature. Use of biosynthetic pathways in synthesis of new chemical entities. Applications of small molecules in chemical genetics and structural biology. Solving biological problems using synthetic biomolecules.—II. (II.) Beal

240. Advanced Analytical Chemistry (3)
Lecture—3 hours. Prerequisite: courses 110A and 115 or the equivalent. Numerical treatment of experimental data; thermodynamics of electrolyte and non-electrolyte solutions; complex equilibria in aqueous and non-aqueous solutions; potentiometry and specific ion electrodes; mass transfer in liquid solutions; fundamentals of separation science, including column, gas and liquid chromatography.—I. (I.)

241A. Surface Analytical Chemistry (3)
Lecture—3 hours. Prerequisite: course 110C or the equivalent. Concepts of surfaces and interfaces: physical properties, unique chemistry and electronic effects. Focus on gas-solid interfaces, with some discussion of liquid-solid interfaces. Offered in alternate years.—I.

241B. Laser and X-ray Spectroscopy (3)
Lecture—3 hours. Prerequisite: course 110B or the equivalent. Concepts and mechanisms of light-matter interactions. Chemical applications of modern spectroscopic methods, including multiphoton spectroscopy, time-resolved laser and x-ray photolysis, and phase-contrast x-ray imaging. Offered in alternate years.—I.

241C. Mass Spectrometry (3)
Lecture—3 hours. Prerequisite: course 110C and 115 or the equivalent. Mass spectrometry and related methods with emphasis on ionization methods, mass analyzers, and detectors. Related methods may include ion-molecule reactions, unimolecular dissociation of organic and bio-organic compounds, and applications in biological and environmental analysis. Offered in alternate years.—II.

241D. Electroanalytical Chemistry (3)
Lecture—3 hours. Prerequisite: course 110C and 115 or the equivalent. Electroanalytical chemistry with consideration of mass transfer and electrode kinetics for polarizable electrodes. Current-potential curves for a variety of conditions, including both potentiostatic and galvanostatic control, and their application in chemical analysis. Offered in alternate years.—II.

241E. Microscopy and Imaging Techniques (3)
Lecture—3 hours. Prerequisite: course 110C and 115 or the equivalent. Introduction to modern microscopy and imaging techniques: scanning tunneling, atomic force, far-field optical, fluorescence, scanning near-field optical, and scanning electron microscopy. Application to nanoscience and analytical and bioanalytical chemistry. Some laboratory demonstrations. Offered in alternate years.—II.

261. Current Topics in Chemical Research (2)
Lecture—2 hours. Prerequisite: graduate standing in Chemistry or consent of instructor. Designed to help chemistry graduate students develop and maintain familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit when topics differ.—I, II, III. (I, II, III.)

263. Introduction to Chemical Research Methodology (3)
Laboratory/discussion—9 hours. Prerequisite: course 293 and graduate student standing in Chemistry; consent of instructor. Introduction to identification, formulation, and solution of meaningful scientific problems including experimental design and/or theoretical analyses of new and prevailing techniques, theories and hypotheses. May be repeated for credit when topic differs. (S/U grading only.)—I, II, III. (I, II, III.)

264. Advanced Chemical Research Methodology (6)
Laboratory/discussion—18 hours. Prerequisite: course 263 or consent of instructor. Applications of the methodology developed in Chemistry 263 to experimental and theoretical studies. Advanced methods of interpretation of results are developed. Includes the preparation of manuscripts for publication. May be repeated for credit when topic differs. (S/U grading only.)—I, II, III. (I, II, III.)

280. Seminar in Ethics for Scientists (2)
Seminar—2 hours. Prerequisite: graduate standing in any department of Science or Engineering. Studies of topical and historical issues in the ethics of science, possibly including issues such as proper authorship, peer review, fraud, plagiarism, responsible collaboration, and conflict of interest. Limited enrollment. (Same course as Engineering Chemical and Materials Science 280 and Physics 280.) (S/U grading only.)—III. (III.)

290. Seminar (2)
Seminar—2 hours. Prerequisite: consent of instructor. (S/U grading only.)—I, II, III. (I, II, III.)

293. Introduction to Chemistry Research (1)
Discussion—2 hours. Designed for incoming graduate students preparing for higher degrees in chemistry. Group and individual discussion of research activities in the Department and research topic selection. (S/U grading only.)—I. (I.)

294. Presentation of Chemistry Research (1)
Seminar—2 hours. Prerequisite: graduate standing; restricted to graduate students in Chemistry who have not yet given their departmental presentation. Introduces first- and second-year Chemistry graduate students to the process of giving an effective research presentation. Advanced Ph.D. students give formal seminars describing the design and execution of their research projects. May be repeated three times for credit. (S/U grading only.)—II, III. (II. III.)

295. Careers in Chemistry (1)
Seminar—2 hours. Prerequisite: graduate standing in Chemistry. Designed to give Chemistry graduate students an in-depth appreciation of career opportunities with a M.S. or Ph.D. degree in chemistry. Professional chemists (and allied professionals) give seminars describing both research and career insights. May be repeated for credit 3 times. (S/U grading only.)—I.

296. Research in Pharmaceutical Chemistry (6)
Laboratory—18 hours. Prerequisite: courses 130A and 130B, 135, and 233 (may be taken concurrently). Restricted to students in the Integrated B.S./M.S. Program in Chemistry. The laboratory provides qualified graduate students with the opportunity to pursue original investigation in Pharmaceutical Chemistry and allied fields in order to fulfill the letter-graded research requirement of the Integrated B.S./M.S. Program in Chemistry (Pharmaceutical Chemistry Emphasis). May be repeated three times for credit.—I, II, III. (I, II, III.)

298. Group Study (1-5)

299. Research (1-12)
The laboratory is open to qualified graduate students who wish to pursue original investigation. Students wishing to enroll should communicate with the department well in advance of the quarter in which the work is to be undertaken. (S/U grading only.)

Professional Courses

390. Methods of Teaching Chemistry (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate student standing in Chemistry and consent of instructor. Practical experience in methods and problems of teaching chemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting of discussion sessions and student laboratories. Participation in the teaching program required for Ph.D. in chemistry. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

392. Advanced Methods of Teaching Chemistry (2)
Lecture—2 hours. Prerequisite: course 390. Advanced topics in teaching chemistry. Analysis and discussion of curricular design, curricula materials, teaching methods and evaluation. For students who are planning a career in teaching chemistry. (P/NP grading only.)—III. (III.)

Chicana/Chicano Studies

(College of Letters and Science)

Adela de la Torre, Ph.D., Chairperson of the Department

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Committee in Charge

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Miroslava Chávez-García, Ph.D., Associate Professor
Sergio de la Mora, Ph.D., Associate Professor
Adela de la Torre, Ph.D., Professor
Natalia Deeb Sossa, Ph.D., Assistant Professor
Yvette Flores, Ph.D., Professor
Carlos F. Jackson, M.F.A. Assistant Professor

Faculty

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Sergio de la Mora, Ph.D., Associate Professor
Adela de la Torre, Ph.D., Professor
Yvette Flores, Ph.D., Professor
Lorena Garcia, Dr.P.H., Assistant Professor
Carlos F. Jackson, M.F.A. Assistant Professor
Malaquias Montoya, B.F.A., Professor

Emeriti Faculty

Malaquias Montoya, B.F.A., Professor Emeritus
Beatriz Pesquera, Ph.D., Associate Professor Emerita
Refugio Rochin, Ph.D., Professor Emeritus
Adaljiza Sosa-Riddell, Ph.D., Senior Lecturer Emerita

The Major Program

The Department of Chicana/Chicano Studies offers an interdisciplinary curriculum focusing on the Chicana/Chicano experience through an analysis of class, race, ethnicity, gender and sexuality, and cultural expression. The department offers a major leading to the Bachelor of Arts degree and a minor that can satisfy breadth requirements for the College of Letters and Science. Both the major and minor frame an analysis within the historical and contemporary experiences of Chicanas/os in the Americas. The major gives students an opportunity to specialize in one of two emphases: Cultural Studies or Social/Policy Studies. Students in the major are expected to read, write, and speak Spanish at a level suitable for future study and work in Chicana/o and Latina/o settings. There are no language requirements for the minor, and all Chicana/Chicano Studies courses are open to students in any major.

The Program. At the lower division level, the major curriculum provides an interdisciplinary overview of various topics. Students are advised to take courses that serve as prerequisites for certain upper division courses. At the upper division level, majors pursue advanced interdisciplinary course work in both the humanities/arts and the social sciences. At this level, students will find courses in Chicana/Chicano history, theory, and several courses taught from a variety of disciplinary perspectives. Majors may specialize in one of two emphases for the A.B. degree. The Cultural Studies emphasis integrates literature, culture, and artistic expression. Social/Policy Studies emphasizes social theory, research methods, area studies in community/political economy, family, societal and health issues.

Career Alternatives. The Cultural Studies emphasis prepares students for professional work in cross-cultural education, cultural/art centers, artistic expression and communications. The Social/Policy Studies emphasis orients students towards professional work in human service delivery, community development, legal services assistance, health services, social welfare and education. Both emphases in the major prepare students for advanced graduate and/or professional studies in related fields.

A.B. Major Requirements:

	UNITS
Cultural Studies Emphasis:	
Preparatory Subject Matter	**16-31**
Chicana/o Studies 10, 50	8
Chicana/o Studies 21 or 40	4
One of Chicana/o Studies 60, 65, 70, or 73	4
Spanish 1, 2, 3, or 28, 31, 32 or the equivalent	0-15
Depth Subject Matter	**40**
One course from Chicana/o Studies 150, 181 History 165, 166B, 169A, 169B	4
Two courses from Chicana/o Studies 100, 110, 111, 112, 130, 131, 132, 181	8
Comparative ethnicity/gender: two upper division courses selected from two of the following areas: African American and African Studies, Asian American Studies, Native American Studies, or Women's Studies	8
Two courses from Chicana/o Studies 110, 112, 120, 121, 122, 123	8
Three courses from Chicana/o Studies 154, 55, 156, 160, 165, 171, 172	12
Total Units for the Major	**56-71**
Social/Policy Studies Emphasis:	
Preparatory Subject Matter	**20-35**
Chicana/o Studies 10, 50	8
Chicana/o Studies 21 or 40	4
One from Chicana/o Studies 60, 65, 70, or 73	4
One from Chicana/o Studies 23, 140A Sociology 46A or Psychology 41	4
Spanish 1, 2, 3, or 28, 31, 32 or the equivalent	0-15
Depth Subject Matter	**40**
One from Chicana/o Studies 150, 181, History 165, 166B, 169A or 169B	4
Two courses from Chicana/o Studies 154, 155, 156, 160, 165, 171, or 172	8
Comparative ethnicity/gender: two upper division courses selected from two of the following areas: African American and African Studies, Asian American Studies, Native American Studies, or Women's Studies	8
Three courses from Chicana/o Studies 100, 110, 111, 112, 130, 131, 132 or 181	12
Two courses from Chicana/o Studies 110, 112, 120, 121, 122 or 123	8
Total Units for the Major	**60-75**

Major Advisers. A. Martinez, A. de la Torre

Minor Program Requirements:

This minor provides a broad overview of the historical, social, political, economic, ideological and cultural forces that shape the Chicana/o and Latina/o experience. The minor is open to all students with or without course work in Spanish. Students should contact the master adviser for a plan approval and verification of the minor.

	UNITS
Chicana/o Studies	**24**
Chicana/o Studies 10 or 50	4
Chicana/o Studies 150 or 181 or History 169A or 169B	4
Four courses from Chicana/o Studies 110, 111, 112, 120, 121, 122, 123, 130, 131, 132, 154, 155, 156, 160, 165, 171, 172	16

Minor Adviser. A. Martinez

Courses in Chicana/Chicano Studies (CHI)

Lower Division Courses

10. Introduction to Chicana/o Studies (4)
Lecture—3 hours; discussion—1 hour. Analysis of the situation of the Chicana/o (Mexican-American) people, emphasizing their history, literature, political movements, education and related areas. GE credit: Div, Wrt.—I, II.

21. Chicana/o and Latina/o Health Care Issues (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10. Overview of health issues of Chicanas/os and Latinas/os in the State of California; role of poverty/lack of education in limited access to health care. GE credit: Div.—Flores, de la Torre

21S. Chicana/o and Latina/o Health Care Issues (4)
Lecture—4 hours. Prerequisite: Spanish 3 or the equivalent. Overview of health issues of Chicanas/os and Latinas/os in the State of California; role of poverty/lack of education and limited access to health care. All course instruction for this course will be in Spanish. Course is taught abroad. Not open for credit to students who have completed course 21. GE Credit: Div.—Flores, de la Torre

23. Qualitative Research Methods (4)
Lecture/discussion—3 hours; discussion—1 hour. Dominant models of qualitative inquiry in educational and social science research as well as mestizo approaches to research with latinos. Emphasis given to choosing and designing culturally appropriate strategies to investigate latino health, education, social context, and policy issues. GE Credit: SocSci.—Chávez-García, Flores

30. United States Political Institutions and Chicanas/os (4)
Lecture/discussion—3 hours; term paper. Overview of the major political institutions and ideologies of the United States and the Chicana/o people's historical and contemporary role in, effects from, and responses to them. Theory, method and critical analysis. GE credit: Div.

40. Comparative Health: Top Leading Causes of Death (4)
Lecture/discussion—3 hours; discussion—1 hour. Prerequisite: Statistics 13 or consent by instructor. Introduction to the epidemiology of the leading causes of death for ethnic/racial minorities. Assessment of disproportionate rates at which ethnic/racial minorities suffer and die from chronic and infectious diseases and injuries and statistical methods used to calculate these rates. Not open for credit to students who have completed course 40S. GE Credit: Div, SciEng, Wrt.—III.

40S. Comparative Health: Leading Causes of Death (4)
Lecture—4 hours. Prerequisite: Statistics 13 or consent by instructor. Introduction to epidemiology of leading causes of death for ethnic/racial minorities. Assessment of disproportionate rates at which ethnic/racial minorities suffer & die from chronic and infectious diseases & injuries & statistical methods used to calculate these rates. Offered abroad. Not open for credit to students who have completed course 40. GE Credit: Div, SciEng, Wrt.

50. Chicana and Chicano Culture (4)
Lecture—3 hours; discussion—1 hour. Interdisciplinary survey of Chicana/o cultural representation in the 20th century. Examines Chicana/o culture within a national and transnational context. Explores how Chicano cultural forms and practices intersect with social/material forces, intellectual formations and cultural discourses. (Former course 20.) GE credit: Div.—I, III. Chabram, de la Mora

60. Chicana and Chicano Representation in Cinema (4)
Lecture—3 hours; discussion—1 hour; film viewing—2 hours. Introductory-level study of Chicana and Chicano representation in cinema. Depiction of Chicana and Chicano experience by Chicana/o filmmakers, as well as by non-Chicanos, including independent filmmakers and the commercial industry. GE credit: ArtHum, Div.—I. de la Mora

65. New Latin American Cinema (4)
Lecture/discussion—2 hours; discussion—1 hour; film viewing—3 hour. Historical, critical, and theoretical survey of the cinemas of Latin America and their relationship to the emergence of U.S. Latino cinema. Emphasis on representation and social identity including gender, sexuality, class, race and ethnicity. GE Credit: ArtHum, Div.—de la Mora

70. Survey of Chicana/o Art (4)
Lecture—4 hours. Survey of contemporary Chicana/o art in context of the social turmoil from which it springs. Includes political use of the poster and the mural, the influence of the Mexican mural and graphic movement, and social responsibility of the artist. GE credit: Div.—I. Jackson, Montoya

73. Chicana/o Art Expression Through Silk Screen (4)
Studio—8 hours; laboratory—4 hours. Introductory level studio course using silk screen and basic printing techniques to explore and develop images of Chicana/o cultural themes and expressions. Students will experiment with images and symbols from their immediate environment/culture. Integrated approach to Chicana/o philosophy of art.—I. Jackson

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: course 10 or consent of instructor. Academic guidance combined with internship in community agencies serving Mexican/Latina/Latino/Chicana/Chicano clients. Use of bilingual skills and knowledge of history, culture, economics, politics and social issues. May be repeated for credit up to 12 units. (P/NP grading only.)

98. Directed Group Study (1-5)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

100. Chicana/Chicano Theoretical Perspective (4)
Lecture/discussion—3 hours; term paper. Prerequisite: courses 10 and 50. Critical examination of emerging Chicana/o Studies theoretical perspectives in light of contemporary intellectual frameworks in the social sciences, arts, and humanities. Includes analysis of practices of self-representation, and socio-cultural developments in the Chicana/o community.—III. Chabram, Chavez-Garcia

110. Sociology of the Chicana/o Experience (4)
Lecture/discussion—4 hours. Prerequisite: course 10 or Sociology 1. The Chicana/o experience in the American society and economy viewed from theoretical perspectives. Immigration, history of integration of Chicana/o labor into American class structure, education inequality, ethnicity, the family and Chicana/o politics. (Former course Sociology 110.) GE credit: SocSci, Div, Wrt.—I.

111. Chicanas/Mexicanas in Contemporary Society (4)
Lecture/discussion—4 hours. Prerequisite: course 10 or 50, Women's Studies 50 or History 169B. Analysis of the role and status of Chicanas/Mexicanas in contemporary society. Special emphasis on their historical role, the political, economic and social institutions that have affected their status, and their contributions to society and their community. (Former course 102.) GE credit: ArtHum.—Flores

112. Globalization, Transnational Migration, and Chicana/o and Latina/o Communities (4)
Lecture—4 hours. Prerequisite: course 10. Chicana/o and Latina/o migration experiences within a global context. Topics include national and/or transnational migration in Mexico, Central America, and the United States. GE credit: SocSci, Div, Wrt.

120. Chicana/o Psychology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 21; introductory psychology course recommended. Introduction to the field of Chicana/o psychology. Analysis of socio-cultural context of Chicanas/os and Latinas/os. Special attention to issues of ethnic identity development, bilingualism, and development of self esteem. Impact of minority experience, migration, acculturation are examined. GE credit: SocSci, Div.—Flores

121. Chicana/o Community Mental Health (4)
Lecture—3 hours; term paper. Prerequisite: course 10 or 20. Mental health needs, problems, and service utilization patterns of Chicanas/os and Latinas/os will be analyzed. An analysis of social service policy, and the economic context of mental health programs. Offered Alternate Years. GE credit: SocSci, Div, Wrt.—II. (II.) Flores

122. Psychology Perspectives Chicana/o and Latina/o Family (4)
Lecture—4 hours. Prerequisite: course 10; introductory psychology course highly recommended, and/or consent of instructor. Role of migration and acculturation on family structure and functioning. From a psychological and Chicana/o Studies perspective, contemporary gender roles and variations in family structures are examined. Special topics include family violence, addiction, family resilience and coping strategies.—I. Flores

122S. Psychology Perspectives Chicana/o and Latina/o Family (4)
Lecture—4 hours. Role of migration and acculturation on family structure and functioning. From a psychological and Chicana/o Studies perspective, contemporary gender roles and variations in family structures are examined. Special topics include family violence, addiction, family resilience and coping strategies. This course is taught abroad. Not open for credit to students who have completed course 122.—IV.) Flores

123. Psychological Perspectives on Chicana/o and Latina/o Children and Adolescents (4)
Lecture—3 hours; term paper. Prerequisite: course 10 or 21, and upper division standing. Psychological and educational development of Chicano/Latino children and adolescents, with particular attention to the formation of ethnic, gender, class, race, and sexual identities. GE Credit: Div, SocSci, Wrt.—II. Flores

125S. Latino Families in the Age of Globalization: Migration and Transculturation (4)
Lecture/discussion—4 hours. Prerequisite: Spanish 3 or equivalent highly recommended. Impact of globalization on Latino families in the American continent. Relationships of political structure, economics and family. Intimate partner violence, child maltreatment and alcohol/drug abuse in contemporary Latino families. Offered in a Spanish speaking country.—Flores

130. United States-Mexican Border Relations (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. Theories of U.S.-Mexican border relations, with an overview of the political, economic, and social relationships and an in-depth analysis of immigration issues, border industrialization, women's organizations, economic crises, and legal issues. GE credit: Div.—I. Chabram, Chávez-García, de la Torre

131. Chicanas in Politics and Public Policy (4)
Lecture/discussion—4 hours. Prerequisite: course 30 or Political Science 1. Historical and political analysis of Chicana/Latina political involvement and activities in the general political system, women's movement, Chicano movement, and Chicana movement. Course also examines the public policy process and the relationship of Chicanas/Latinas to public policy formation. Offered in alternate years. GE credit: SocSci, Div.—II.

131S. Chicanas in Politics and Public Policy (4)
Lecture/discussion—4 hours. Historical and political analysis of Chican/Latina political involvement and activities in the general political system, women's movement, Chicano/a movement. Course also examines the public policy process and the relationship of Chicanas/Latinas to public policy formation. Offered abroad. Not open for credit to students who have completed course 131. GE Credit: Div, SocSci.—II.

132. Political Economy of Chicana/o Communities (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing; lower division Chicana/o Studies course recommended. Historical and contemporary study of political and economic forces which define and influence the development of Chicana/o communities. Includes critiques of traditional and Marxian theories and concepts applicable to Chicana/o communities, case studies of Chicana/o communities, especially in California and Texas.—III.

135S. Transnational Latina/o Political Economy (4)
Lecture—3 hours; term paper. Prerequisite: Spanish 3 or equivalent, or consent of instructor; Economics 1A and 1B recommended. Intensive reading, discussion and research on selected topics from Latin America and the US with regard to immigrant and native communities. Topics include comparative immigration and macroeconomic policies in the US and Latin America. Offered in a Spanish speaking country.

140A. Quantitative Methods: Chicano/Latino Health Research (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: two years of high school algebra or the equivalent in college. Focuses on measuring Latino/Chicano health outcomes using a quantitative approach. Assesses main types of study designs and addresses measurement of disease frequency and health effects. GE Credit: SciEng.

145S. Bi-National Health (5)
Lecture—5 hours. Prerequisite: Biological Sciences 1A-1B-1C, Spanish 21 or 31 or consent of instructor; upper division standing only. Examination of health status and intervention strategies presented in public health care settings, private clinics and by indigenous healers in Mexico. Analysis of impact of high risk diseases. Offered in a Spanish speaking country under supervision of UC Davis faculty/lecturer.—I. Flores, de la Torre

147S. Indigenous Healing and Biodiversity in Latin America (4)
Lecture—3 hours; term paper. Contrast between western and traditional healing practices in Latin America and the role of the natural environment in creating sustainable health delivery systems. Questions of health status attributable to public health and environmental risk factors.—I. de la Torre

150. The Chicana and Chicano Movement (4)
Lecture—3 hours; term paper. Development of the Chicano Movement within the context of the sociopolitical movements of the 1960's in a national and global perspective. Ideological/political perspectives and the implications for political strategies. GE Credit: ArtHum, Div, Wrt.—III.

154. The Chicana/o Novel (4)
Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Introduction to the forms and themes of the Chicana/o novel with special attention to the construction of gender, nationality, sexuality, social class, and the family by contemporary Chicana/o novelists. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126A.) GE credit: ArtHum, Div.—Chabram

155. Chicana/o Theater (4)
Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Examination of the formal and thematic dimensions of Chicana/o theater in the contemporary period with special emphasis on El Teatro Campesino and Chicana Feminist Theater. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126B.)—II. (I.) Chabram

156. Chicana/o Poetry (4)
Lecture—4 hours. Prerequisite: intermediate Spanish or consent of instructor. Survey of Chicana/o poetry with special emphasis on its thematic and formal dimensions. Bilingual readings, lectures, discussions, and writing in Spanish. (Former course Spanish 126C.)—(III.) Chabram

160. Mexican Film and Greater Mexican Identity (4)
Lecture/discussion—4 hours; film viewing—1 hour. Prerequisite: intermediate Spanish. Survey of the role Mexican cinema plays in consolidation and contestation of post-revolutionary Mexican state and in the formation of a greater Mexican cultural identity including Chicana/o identity. Showcases genres, periods, auteurs, movements, and emphasis on gendered and sexualized narratives. GE credit: ArtHum, Div.—II. de la Mora

165. Chicanas, Latinas and Mexicanas in Commercial Media (4)
Lecture/discussion—4 hours; laboratory—2 hours. Prerequisite: course 60 or other film or feminist theory course; conversational fluency in Spanish. The portrayal of Chicanas, Latinas and Mexicanas in commercial media. The relation between the representation of Chicana, Latina, and Mexicana women in commercial television and cinema and the role of women in Mexican and U.S. societies. Offered in alternate years.—de la Mora

170. Contemporary Issues in Chicano Art (4)
Lecture—4 hours. Issues and conflicts in the dismantling of the Contemporary Chicano Art Movement. Response and challenge to the dominant culture.—Jackson

171. Mexican and Chicano Mural Workshop (4)
Studio—8 hours; independent study—1 hour. Prerequisite: course 70 and/or written consent of instructor. The Mural: a collective art process that empowers students and people through design and execution of mural paintings in the tradition of the Mexican Mural Movement; introduces materials and techniques. May be repeated one time for credit. (Same course as Art Studio 171.)—III. Jackson

172. Chicana/o Voice/Poster Silk Screen Workshop (4)
Studio—8 hours; independent study—1 hour. Prerequisite: course 70 and/or 73 and/or written consent of instructor. The poster as a voice art form used by Chicanas/os and other people of color to point to the defects of social and political existence and the possibility for change, from the Chicana/o artists' perspective. May be repeated one time for credit.—II. Jackson

180. Grant Writing in the Chicana/o/Latina/o Community (4)
Lecture—4 hours. Prerequisite: course10, 23 or consent of instructor. Upper division standing. Overview of key elements for grant writing. Topics include community needs assessments, development of human subjects protocols, data collection, methods, evaluation designs and community based methodologies for grant development applications in the Latino community.—de la Torre

181. Chicanas and Latinas in the U.S.: Historical Perspectives (4)
Lecture/discussion—4 hours. Prerequisite: course 10 or Women's Studies 50. Historical issues in the lives of Chicanas, Puertorriquenas, and Cubans in the U.S. and their countries of origin. GE credit: ArtHum, Div, Wrt.—II. Chávez-García

182. Race and Juvenile Justice (4)
Lecture—4 hours. Prerequisite: course 10, Women's Studies 10, or Sociology 10, or equivalent. Individual and institutional responses to "troublesome" youth of color through history and in contemporary society. Emphasis on how race, as well as ethnicity, class, and gender have informed the treatment of "delinquent" youth. Offered in alternate years. GE Credit: ArtHum or SocSci, Div, Wrt.—Chávez-García, de la Torre

192. Internship in the Chicana/Chicano/Latina/Latino Community (1-12)
Internship—3-36 hours. Prerequisite: course 10, 21, or 50, Spanish 3 or the equivalent. Academic guidance combined with internship in community agencies serving Mexican/Latina/Latino/Chicana/Chicano clients. Use of bilingual skills and knowledge of history, culture, economics, politics and social issues. Internship project required. May be repeated for credit up to 12 units. (P/NP grading only.)

192S. Internship (1-12)
Internship. Prerequisite: consent of instructor; course 10, 21, or 50; Spanish 3 or equivalent. May be repeated for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

194HA-194HB-194HC. Senior Honors Research Project (2-5)
Independent study—6-15 hours. Prerequisite: senior standing in Chicana/o Studies major. Student is required to read, research, and write Honors Thesis on Chicana/o Studies topics. (Deferred grading only, pending completion of sequence.)

198. Directed Group Study (1-5)
Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

198S. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

199S. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

230. Chicano/Latino Hispanic Politics (4)
Seminar—3 hours; term paper. Prerequisite: two undergraduate courses in Chicana/o Studies or consent of instructor. Examination of Chicano/Latino political experiences. Evaluate theories, ideology, and practice of Chicano politics. Brief history of Chicano/Latino/Hispanic political activity, comparisons among political modes, gendered politics, and understanding relationships among Chicano, Mexican, American and world politics.—de la Torre

298. Group Study for Graduate Students (1-5)
Prerequisite: graduate standing, consent of instructor. May be repeated for credit when topic differs. (S/U grading only.)

299. Special Study for Graduate Students (1-12)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

Child Development (A Graduate Group)

Lawrence V. Harper, Ph.D., Chairperson of the Group

Group Office. 1337 Hart Hall
(530) 754-4109;
http://humandevelopment.ucdavis.edu/

Faculty

Thomas F. Anders, M.D., Professor Emeritus *(Psychiatry)*
Brenda K. Bryant, Ph.D., Professor *(Human and Community Development)*
Zhe Chen, Ph.D., Professor *(Human and Community Development)*
Katherine J. Conger, Ph.D., Associate Professor *(Human and Community Development)*
Rand Conger, Ph.D., Professor *(Human and Community Development)*
Kathryn G. Dewey, Ph.D., Professor *(Nutrition)*
Emilio Ferrer, Ph.D., Associate Professor *(Psychology)*
Lorena Garcia, M.P.H. Dr.P.H., Assistant Professor *(Department of Public Health Sciences)*
Beth Goodlin-Jones, Ph.D., Associate Professor *(Psychiatry, M.I.N.D. Institute)*
Gail Goodman, Ph.D., Professor *(Psychology)*
Kevin Grimm, Ph.D., Assistant Professor *(Psychology)*
Amanda Guyer, Ph.D., Assistant Professor *(Human and Community Development, Center for Mind and Brain)*
Randi Hagerman, M.D., Director *(M.I.N.D. Institute)*
Robin L. Hansen, M.D., Associate Professor *(Pediatrics)*
Lawrence V. Harper, Ph.D., Professor *(Human and Community Development)*
Paul Hastings, Ph.D., Professor *(Psychology)*
David Hessl, Ph.D., Associate Professor *(Psychiatry, M.I.N.D. Institute)*
Suad Joseph, Ph.D., Professor *(Anthropology)*
Penelope Knapp, M.D., Professor *(Psychiatry, M.I.N.D. Institute)*
Rosemarie H. Kraft, Ph.D., Lecturer SOE *(Human and Community Development)*
Ann Mastergeorge, Ph.D., Assistant Adjunct Professor *(Human and Community Development, M.I.N.D. Institute)*
Elizabeth Miller, M.D., Ph.D., Assistant Professor *(Pediatrics)*
Lisa Miller, Ph.D., Associate Professor *(Human and Community Development)*
Peter Mundy, Ph.D., Professor *(Education, M I.N.D. Institute)*
Adrienne Nishina, Ph.D., Assistant Professor *(Human and Community Development)*
Lisa Oakes, Ph.D., Professor *(Psychology, Center for Mind and Brain)*
Beth A. Ober, Ph.D., Professor *(Human and Community Development)*
Lenna Ontai, Ph.D., Associate Specialist in Cooperative Extension *(Human and Community Development)*
Richard Ponzio, Ph.D., Specialist in Cooperative Extension, Emeritus *(Human and Community Development)*
Susan Rivera, Ph.D., Associate Professor *(Psychology)*
Richard W. Robins, Ph.D., Professor *(Psychology)*
Sally Rogers, Ph.D., Professor *(Psychiatry, M.I.N.D. Institute)*
Julie Schweitzer, Ph.D., Associate Professor *(Psychiatry, M.I.N.D. Institute)*
Phillip Shaver, Ph.D., Professor *(Psychology)*
Ross A. Thompson, Ph.D., Professor *(Psychology)*
Susan Timmer, Ph.D., Clinical Specialist *(Pediatrics)*
Brian Trainor, Ph.D., Assistant Professor *(Psychology)*
Anthony Urquiza, Ph.D., Associate Professor *(Pediatrics)*
Karen Watson-Gegeo, Ph.D., Professor *(Education) Distinguished Graduate Mentoring Award*
Keith Widaman, Ph.D., Professor *(Psychology)*

Affiliated Faculty

Kristin Alexander, Ph.D., Associate Professor *(Child Development, Sacramento State University)*
Barbara Lehman, Ph.D., Assistant Professor *(Psychology, Western Washington University)*
Katherine Masyn, Ph.D., Assistant Professor of Education *(Harvard University, Graduate School of Education)*

Graduate Study. The Graduate Group in Child Development offers a multidisciplinary program leading to an M.S. degree. The program provides students with an opportunity to pursue a coordinated course of postgraduate study in the field of child development which cuts across departmental boundaries. Students may work with children and families in the community, as well as the University's Center for Child and Family Studies. Recipients of the degree gain sufficient background to engage in professions that directly (e.g., preschool, 4-H) or indirectly (e.g., social policy) involve children and families, obtain positions in teaching or research settings, or pursue further study leading to a doctorate in child development, human development, clinical psychology, or related fields.

Applicants seeking consideration for admissions and fellowships must submit all materials by January 1.

Graduate Adviser. Contact Group office.

Chinese

See Asian American Studies, on page 167; East Asian Languages and Cultures, on page 213; and East Asian Studies, on page 217.

Classics

(College of Letters and Science)

David A. Traill, Ph.D., Program Director

Department Office. Spanish and Classics;
618 Sproul Hall;
(530) 752-0835; http://classics.ucdavis.edu

Faculty

Don Abbott, Ph.D., Professor *(English)*
Emily Albu, Ph.D., Associate Professor
Noha Radwan, Ph.D., Assistant Professor *(Comparative Literature)*
Lynn E. Roller, Ph.D., Professor *(Art History)*
Carey Seal, Ph.D., Assistant Professor
Seth L. Schein, Ph.D., Professor *(Comparative Literature)*
Jocelyn Sharlet, Ph.D., Assistant Professor *(Comparative Literature)*
Rex Stem, Ph.D., Assistant Professor
David A. Traill, Ph.D., Professor
Akihiko Watanabe, Ph.D., Assistant Professor

Emeriti Faculty

Wesley E. Thompson, Ph.D., Professor Emeritus

Affiliated Faculty

Patricia Bulman, Ph.D., Lecturer *(Classics)*
Katherine Good, M.A., Lecturer *(Hindi-Urdu)*
Shayma Hassouna, M.A., Lecturer *(Arabic)*
Alon Raab, M.A., Lecturer *(Hebrew)*
John Rundin, Ph.D., Lecturer *(Classics)*

Emeriti Faculty

Wesley E. Thompson, Ph.D., Professor Emeritus

Affiliated Faculty

Patricia Bulman, Ph.D., Lecturer
John Rundin, Ph.D., Lecturer

The Major Program

Classical Civilization is an interdisciplinary major that examines the ancient Mediterranean cultures of Greece, Rome and the Near East, with courses offered on the languages, history, literature, religions, myths, art and archaeology of these societies, their achievements in rhetoric and philosophy, and their political and social institutions. Minor programs in Classical Civilization, Greek, and Latin, and many General Education courses are offered also.

The Program. The major has two tracks: *(1)* Classical and Mediterranean Civilizations, and *(2)* Classical Languages and Literatures. The core of both major tracks consists of two years of Latin, Greek or Hebrew, the introductory sequence on the ancient Mediterranean world (Classics 1, 2, 3), the advanced seminar (Classics 190), and a number of electives. The Classical and Mediterranean Civilization track allows students to choose their electives from a broadly balanced program in history, art and archaeology, literature, philosophy and rhetoric. The Classical Languages and Literatures track focuses more intensively on language and literature, requiring the study of two languages and allowing fewer electives. Students planning to go on to graduate work in Classics should take Track 2 and study as much Latin and Greek as possible. They should make a point of talking to an advisor early in their undergraduate program. They are also advised to acquire a reading knowledge of French or German.

Career Opportunities. A degree in Classical Civilization represents a solid liberal arts education that provides an excellent foundation for a wide variety of careers. In the last twenty-five years, many majors have applied to law or medical schools and practically all have been accepted. Additional career options include library and museum work, teaching, journalism, and graduate study in Classics, art, archaeology, history, literature, philosophy, and religion.

Classical Civilization

A. B. Major Requirements:

UNITS

Classical and Mediterranean Civilizations track

Preparatory Subject Matter 26-27

Latin 1-2-3, or Greek 1-2-3, or Hebrew 1-2-3 15
Two courses from Classics 1, 2, 3 8
One additional course from: Art History 1A; Classics courses 1 through 50 (except 30 and 31); Comparative Literature 1; Philosophy 21; Religious Studies 21, 40 3-4

Depth Subject Matter 40

Upper division courses in Latin, Greek or Hebrew 12
Classics 190 4
Six additional courses selected from at least three of the following groups 24
Of these 24 units, at least 12 must be in Latin, Greek, Hebrew, or Classics, and one course must be selected from group (c).

(a) Literature and Rhetoric:
Additional upper division courses in Latin, Greek and Hebrew; Classics 102, 110, 140, 141, 142, 143

(b) History:
History 102A, 111A, 111B, 111C; Religious Studies 102, 125

(c) Art and Archaeology:
Classics 171, 172A, 172B, 173, 174, 175

(d) Philosophy and Religion:
Classics 150; Philosophy 143, 160, 161, 162; Political Science 118A; Religious Studies 141A, 141B, 141C

Total Units for the Major 66-67

Classical Languages and Literatures track

Preparatory Subject Matter 34

Two of the following sequences: Latin 1-2-3; Greek 1-2-3; Hebrew 1-2-3 30
Classics 1, 2, or 3 4

Depth Subject Matter 36

Six upper division courses in the two chosen languages, with at least two courses in each language 24
Classics 190 4
Two additional courses selected from any of the following groups 8
(a) Literature and Rhetoric:
Additional upper division courses in Latin, Greek and Hebrew; Classics 102, 110, 140, 141, 142, 143
(b) History:
History 102A, 111A, 111B, 111C; Religious Studies 102, 125
(c) Art and Archaeology:
Classics 171, 172A, 172B, 173, 174, 175
(d) Philosophy and Religion:
Classics 150; Philosophy 143, 160, 161, 162; Political Science 118A; Religious Studies 141A, 141B, 141C

Total Units for the Major 70

Major Advisers. E.M. Albu, P.A. Bulman, A. Watanabe

Minor Program Requirements:

The Department offers minors in Classical Civilization, Greek and Latin for those wishing to follow a shorter but formally recognized program of study in Classics.

UNITS

Classical Civilization 20

Classics 1, 2, or 3 4
One upper division course in Latin, Greek or Hebrew 4
Two additional upper division courses in Classics, Latin, Greek or Hebrew 8
One additional upper division course selected from any of the groups *(a)* through *(d)* in the Classical Civilization major 4

Greek 20

Classics 1 or 2 4
Three upper division courses in Greek 12
One additional upper division course in Classics, Latin, Greek or Hebrew 4

Latin 20

Classics 3 4
Three upper division courses in Latin 12
One additional upper division course in Classics, Latin, Greek or Hebrew 4

Honors Program. Candidates for high or highest honors in Classical Civilization must write a senior honors thesis under the direction of a faculty member in Classics. Potential candidates for the honors program must enroll in Classics 194HA and 194HB, normally during the first two quarters of the senior year. Enrollment is limited to upper division students with a minimum of 135 units, and a 3.500 grade point average in courses in the Classical Civilization major. For further information, students should consult with the major adviser or program director. The requirements for the honors program are in addition to the regular requirements for the major in Classical Civilization.

Graduate Study. The Department offers a master's degree in Classics with emphasis on either Greek or Latin; however, admission into the graduate program has been suspended.

Prerequisite credit. Credit will not normally be given for a lower division course in Latin or Greek if it is the prerequisite of a course already successfully completed. Exceptions can be made by the Program Director only.

Courses in Arabic, Classics, Greek, Hebrew, Hindi-Urdu, and Latin follow in alphabetical order.

Courses in Arabic (ARB)

Lower Division Courses

1. Elementary Arabic 1 (5)
Lecture/discussion—5 hours. Introduction to basic Arabic. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including the alphabet and basic syntax. Focus on standard Arabic with basic skills in spoken Egyptian and/or one other colloquial dialect.—Hassouna

1A. Intensive Elem Arabic (15)
Lecture/discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Modern Standard Arabic through development of all language skills in a cultural context with emphasis on communicative proficiency. Not open for credit to students who have completed course 1, 2, or 3. Not offered every year.—IV. (IV.)

2. Elementary Arabic 2 (5)
Lecture/discussion—5 hours. Prerequisite: course 1 or with instructor's consent after student takes all components of the course 1 final exam. Continues introduction to basic Arabic from course 1. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including syntax. Focus on standard Arabic and limited use of spoken Egyptian and/or one other colloquial dialect.—II. (II.) Hassouna

3. Elementary Arabic 3 (5)
Lecture/discussion—5 hours. Prerequisite: course 1 and 2 or with consent of instructor after taking all components of the final exam for course 1 and 2. Continues introduction to basic Arabic from courses 1 and 2. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including syntax. Focus on standard Arabic with limited use of spoken Egyptina and/or one other colloquial dialect.—III. (III.) Hassouna

21. Intermediate Arabic 21 (5)
Lecture/discussion—5 hours. Prerequisite: course 1, 2, 3 or with consent of instructor after taking all parts of course 3 final exam. Builds on courses 1, 2, and 3. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including idiomatic expression. Focus on standard Arabic with limited use of Egyptian and/or one other colloquial dialect.—I. (I.) Hassouna

22. Intermediate Arabic 22 (5)
Lecture/discussion—5 hours. Prerequisite: course 21 or with consent of instructor after taking all parts of course final 21 exam. Continues from course 21. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including idiomatic expression. Focus on standard Arabic with limited use of Egyptian and/or one other colloquial dialect.—II. (II.) Hassouna

23. Intermediate Arabic 23 (5)
Lecture/discussion—5 hours. Prerequisite: course 22 or with consent of instructor after completing all parts of the final exams for courses 21 and 22. Continues from courses 21 and 22. Interactive and integrated presentation of listening, speaking, reading, and writing skills, including idiomatic expression. Focus on standard Arabic with limited use of Egyptian and/or one other colloquial dialect.—III. (III.) Hassouna

Upper Division Courses

122. Advanced Arabic (4)
Lecture/discussion—3 hours. Prerequisite: course 121 or permission of instructor. Continuation of course 121. Further development of advanced skills in reading, listening, writing, and speaking standard Arabic through work with texts, video, and audio on cultural and social issues. Limited use of one colloquial dialect.—II. (II.) Radwan

123. Advanced Arabic (4)
Lecture/discussion—3 hours. Prerequisite: course 122 or permission of instructor. Continuation of course 122. Further development of advanced skills in reading, listening, writing, and speaking standard Arabic through work with texts, video, and audio on cultural and social issues. Limited use of one colloquial dialect.—III. (III.) Radwan

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. Development of reading, writing, speaking, and listening skills in advanced Arabic. Materials may include al-Kitaab Part Two or Three, news articles and broadcasts, short stories, poetry, novels, essays, scripture, prophetic traditions, audio recordings, and television and film. May be repeated four times for credit if content differs. (P/NP grading only.)—I, II, III. (I, II, III.)

Courses in Classics (CLA)

Lower Division Courses

1. The Ancient Near East and Early Greece: 3000-500 B.C.E. (4)
Lecture—3 hours; term paper. Introduction to the literature, art, and social and political institutions of ancient Mesopotamia, Egypt, Palestine, and early Greece from 3000 to 500 B.C.E. GE credit: ArtHum, Wrt.—(II.) Bulman

2. Ancient Greece and the Near East: 500 to 146 B.C.E. (4)
Lecture—3 hours; term paper. Introduction to the literature, art and thought and the political and social institutions and values of Greece and its eastern Mediterranean neighbors—the Persians, Egyptians, and Judeans. GE credit: ArtHum, Wrt.—II. (II.) Watanabe

3. Rome and the Mediterranean: 800 B.C.E. to 500 C.E. (4)
Lecture—3 hours; discussion—1 hour. Introduction to the history, literature, material culture, political and social institutions and values of Roman Civilization, with an emphasis on the development of the Roman Empire and the interactions of Roman culture with other Mediterranean cultures. GE credit: ArtHum.—III. (III.) Stem

10. Greek, Roman, and Near Eastern Mythology (3)
Lecture—3 hours. Examination of major myths of Greece, Rome, and the Ancient Near East; their place in the religion, literature and art of the societies that produced them; their subsequent development, influence and interpretation. GE credit: ArtHum.—I, II, III. (I, II, III.) Rundin, Stem, Watanabe

15. Women in Classical Antiquity (4)
Lecture—3 hours; term paper. Lives and roles of women in ancient Greece and Rome. Readings from history, philosophy, medical and legal documents, literature and myth. GE credit: ArtHum, Div, Wrt.—III. (III.)

20. Pompeii AD 79 (4)
Lecture—3 hours; term paper. Roman life in an urban community at the time of the eruption of Vesuvius. Slide presentations of the archeological evidence will be supplemented by selected readings from Petronius' *Satyricon* and other ancient authors. Offered in alternate years. GE credit: ArtHum, Wrt.

30. Greek and Latin Elements in English Vocabulary (3)
Lecture—3 hours. Knowledge of Latin and Greek not required. Elements of Greek and Latin vocabulary for increased understanding of English word formation and improved ability to understand and retain unfamiliar words. Emphasis on Greek and Latin elements but other languages not neglected.—III. (III.) Albu, Bulman, Rundin

31. Greek and Latin Elements in Technical Vocabulary (3)
Lecture—3 hours. Knowledge of Greek and Latin not required. Elements of Greek and Latin vocabulary to increase understanding of English word formation in

medical, scientific and technical terminology and improve ability to understand and retain unfamiliar terms.

50. The Rise of Science in Ancient Greece (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Mathematics 16A or the equivalent. Study of the emergence of scientific rationality in ancient Greece and its political and social context; concentration on four areas: mathematics, medicine, cosmology, and psychology. Reading from the Presocratics, Hippocrates, Plato, Aristotle, and Hellenistic philosophers. GE credit: ArtHum, Wrt.

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101D. Topics in the Classical Tradition (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one course in Classics or consent of instructor. Topics in the classical tradition from late antiquity to the present. Topics may be ordered by time or place (e.g. the classical tradition in Washington, D.C.) or by theme or genre (e.g. cinematic representations of the ancient world). May be repeated two times for credit when topic differs. Offered irregularly. GE credit: ArtHum, Wrt.—III. Watanabe

102. Film and the Classical World (4)
Lecture—3 hours; film viewing—2.5 hours. Prerequisite: any Classics course except 30 or 31. The Classical World as portrayed in films. Viewings and discussions of modern versions of ancient dramas, modern dramas set in the Ancient Mediterranean world, and films imbued with classical themes and allusions. Supplementary readings in ancient literature and mythology. GE credit: ArtHum, Wrt.—(II.) Albu

110. Origins of Rhetoric (4)
Lecture—3 hours; term paper. Prerequisite: one course in ancient history or consent of instructor. Issues in the development of rhetoric from its origins in ancient Greece to A.D. 430. Special attention to works of Plato, Aristotle, Cicero, and Quintilian. Role of grammar and rhetoric in schools of Roman Empire. The Christian rhetoric of Saint Augustine. Not open for credit to students who have completed Rhetoric and Communication 110 or Communication 110. (Former course Rhetoric and Communication 110.) GE credit: ArtHum, Wrt.—(III.)

140. Homer and Ancient Epic (4)
Lecture—3 hours; term paper. Prerequisite: course 4A or 10 or Comparative Literature 1. Reading of Iliad, dyssey, and Aeneid in English. Discussion of Homer's and Vergil's techniques of composition, the beliefs and values of their respective societies and the influence of Homer on Vergil. Offered in alternate years. GE credit: ArtHum, Wrt.—(II.) Bulman, Schein, Seal

141. Greek and Roman Comedy (4)
Lecture—3 hours; conference—1 hour. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. Offered in alternate years. GE credit: ArtHum, Wrt.—Bulman

142. Greek and Roman Novel (4)
Lecture—3 hours; term paper. Examination of the ancient Greek romances and their development into the grotesque realism of Petronius' Satyricon, and the religious mysticism of Apuleius' The Golden Ass. GE credit: ArtHum, Wrt.—Schein, Watanabe

143. Greek Tragedy (4)
Lecture—3 hours; term paper. Prerequisite: course 4A or 10. Reading in English of selected plays of Aeschylus, Sophocles and Euripides. Lectures on the development and influence of Athenian tragedy. Offered in alternate years. GE credit: ArtHum, Wrt.—(II.) Bulman

150. Socrates and Classical Athens (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 4A. Study of the major sources of our knowledge of Socrates to assess his role in the politics and culture of ancient Athens; his method of teaching and its place in Western thought. GE credit: ArtHum, Wrt.—Seal

171. Mediterranean Bronze Age Archaeology (4)
Lecture—3 hours; extensive writing. Prerequisite: one of course 1, 2, 10, 15, Art History 1A, or Anthropology 3 recommended. Archaeological monuments of the ancient Near East, including Egypt and Mesopotamia, and of Greece and Crete during the Bronze Age. Special emphasis on the problems of state formation and on the co-existence and collapse of Bronze Age societies. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—Roller

172A. Early Greek Art and Architecture (4)
Lecture—3 hours; term paper. Examination of the origin and development of the major monuments of Greek art and architecture from the eighth century to the mid-fifth century B.C. Not open for credit to students who have completed Art History 154A. (Same course as Art History 172A.) Offered in alternate years. GE credit: ArtHum, Wrt.—Roller

172B. Later Greek Art and Architecture (4)
Lecture—3 hours; term paper. Study of the art and architecture of later Classical and Hellenistic Greece, from the mid-fifth century to the first century B.C. Not open for credit to students who have completed Art History 154B. (Same course as Art History 172B.) Offered in alternate years. GE credit: ArtHum, Wrt.—(II.) Roller

173. Roman Art and Architecture (4)
Lecture—3 hours; term paper. The art and architecture of Rome and the Roman Empire, from the founding of Rome through the fourth century C.E. Not open for credit to students who have completed Art History 155. (Same course as Art History 173.) Offered in alternate years. GE credit: ArtHum, Wrt.—II. Roller

174. Greek Religion and Society (4)
Lecture—3 hours; term paper. Prerequisite: a lower division Classics course, except Classics 3, 20, 30, or 31. Cults, festivals, and rituals of Greek religious practice and their relationship to Greek social and political institutions, and to Greek private life. Includes discussion of major sanctuaries at Olympia, Delphi, Athens, and others. Offered in alternate years. GE credit: ArtHum, Wrt.—Rundin

175. Architecture and Urbanism in Mediterranean Antiquity (4)
Lecture—3 hours; extensive writing. Prerequisite: a lower division course (except 30, 31); Art History 1A recommended. Architecture and urban development in the ancient Near East, Greece, and Rome. Special emphasis on the social structure of the ancient city as expressed in its architecture, and on the interaction between local traditions and the impact of Greco-Roman urbanism. (Same course as Art History 175.) Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(II.) Roller

190. Senior Seminar (4)
Seminar—3 hours; term paper. Prerequisite: completion of one upper division course in Latin, Greek or Hebrew or consent of instructor. Advanced interdisciplinary study of a problem in the ancient Mediterranean world using the techniques of history, archaeology, art history and philology. May be repeated for credit with consent of instructor. GE credit: ArtHum, Wrt.—I.

194HA-194HB. Special Study for Honors Students (3-3)
Discussion—1 hour; independent study; term paper. Prerequisite: admission to the honors program and consent of faculty member supervising honors thesis. Directed reading, research and writing culminating in the completion of a senior honors thesis under the direction of faculty adviser. (Deferred grading only, pending completion of sequence. P/NP grading only.)—I-II, II-III.

197TC. Community Tutoring in Classical Languages (1-5)
Tutoring—1-5 hours. Prerequisite: consent of instructor. Supervised instruction of Greek or Latin in nearby schools by qualified students in department. May be repeated for credit up to 5 units. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: upper division standing. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Courses

200A. Approaches to the Classical Past (4)
Seminar—3 hours; term paper.Survey of major areas of classical scholarship, with special emphasis on the continuing impact of Mediterranean antiquity on later literature, history, art, and culture. Offered in alternate years.—(I.) Albu, Watanabe

200B. Approaches to the Classical Past (4)
Independent study—4 hours. Prerequisite: course 200A; graduate student status. Research project on major area of Classical scholarship, with special emphasis on the continuing impact of Mediterranean antiquity on later literature, history, art, and culture. Limited enrollment. Offered in alternate years.—(III.) Albu

201. Introduction to Classical Philology (4)
Seminar—3 hours; term paper. Survey of major contemporary areas of classical scholarship with special attention devoted to current problems in literary and textual criticism.

202. Homer (4)
Seminar—3 hours; term paper. Readings in the Iliad and Odyssey: the origins and transmission of the poems.

203. Vergil (4)
Seminar—3 hours; term paper. Reading of selected books of the Bucolics, Georgics, and Aeneid. Emphasis will be placed on the study of Vergilean poetic language.—Traill

204. Greek and Roman Comedy (4)
Seminar—3 hours; term paper. Historical and critical problems in Aristophanes or New Comedy. May be repeated for credit.

205. Latin Lyric and Elegy (4)
Seminar—3 hours; term paper. Critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit.—Traill

206. Greek Historiography (4)
Seminar—3 hours; term paper. Development of historical writing in Greece. May be repeated for credit.

207. Greek Drama (4)
Seminar—3 hours; term paper. Literary and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit.

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Courses in Greek (GRK)

Lower Division Courses

1. Elementary Greek (5)
Lecture—5 hours. Introduction to the basic grammar and vocabulary of Classical and New Testament Greek. Development of translation skills with emphasis on Greek-English. (Students who have successfully completed Greek 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)—I. (I.) Bulman

2. Elementary Greek (5)
Lecture—5 hours. Prerequisite: course 1. Continuation of course 1.—II. (II.) Bulman

2NT. Elementary New Testament Greek (1)
Lecture—1 hour. Prerequisite: course 2 (concurrently). Supplementary study of New Testament Greek.—II. (II.) Bulman

3. Intermediate Greek (5)
Lecture—5 hours. Prerequisite: course 2. Continuation of course 2. Selected readings from Greek authors.—III. (III.) Bulman

3NT. Elementary New Testament Greek (1)
Lecture—1 hour. Prerequisite: course 3 (concurrently). Supplementary study of New Testament Greek.—III. (III.) Bulman

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100N. Readings in Greek Prose (4)
Lecture—3 hours; recitation—1 hour. Prerequisite: course 3. Selected readings from pagan and Christian sources. May be repeated for credit with consent of instructor. GE credit: ArtHum, Wrt.—I. (I.) Rundin, Seal

101. Plato (4)
Lecture—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.—(II.) Seal

102. Euripides (4)
Lecture—3 hours; term paper. Prerequisite: course 101. GE credit: ArtHum, Wrt.—III. Bulman

103A. Homer: Iliad (4)
Recitation—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.—(II.) Schein, Traill

103B. Homer: Odyssey (4)
Recitation—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.—(II.) Schein, Traill

104. Menander (4)
Lecture—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.

105N. Attic Orators (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Selected readings from the orators of 4th and 5th century Athens. May be repeated for credit with consent of instructor. Offered in alternate years. GE credit: ArtHum, Wrt.—Stem

110. Readings in the Greek Novel (4)
Lecture—3 hours; term paper. Prerequisite: course 100N. Selected readings from Greek prose fiction of the late classical, Hellenistic and imperial periods. Offered in alternate years. May be repeated two times for credit with consent of instructor. GE credit: Wrt.—(III.) Watanabe

111. Sophocles (4)
Lecture—3 hours; term paper. Prerequisite: course 103. GE credit: ArtHum, Wrt.—(III.) Schein

112. Aristophanes (4)
Lecture—3 hours; term paper. Prerequisite: course 103. GE credit: ArtHum, Wrt.

113. Thucydides (4)
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.—Watanabe

114. Lyric Poetry (4)
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.—Bulman

115. Aeschylus (4)
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.—Schein

116. Herodotus (4)
Lecture—3 hours; term paper. Prerequisite: course 103. Offered in alternate years. GE credit: ArtHum, Wrt.—Stem, Watanabe

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Courses in Hebrew (HEB)

Lower Division Courses

1. Elementary Hebrew (5)
Lecture/discussion—4 hours; laboratory—1 hour. Speaking, listening, comprehension, reading and writing fundamentals of modern Hebrew. (Students who have successfully completed, with a C- or better, Hebrew 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)—I. (I.) Raab

2. Elementary Hebrew (5)
Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 1 or the equivalent. Speaking, listening, comprehension, reading and writing fundamentals of modern Hebrew.—II. (II.) Raab

3. Elementary Hebrew (5)
Lecture/discussion—4 hours; laboratory—1 hour. Prerequisite: course 2 or the equivalent. Speaking, listening comprehension, reading and writing fundamentals of modern Hebrew.—III. (III.) Raab

21. Intermediate Mod Hebrew I (5)
Lecture/discussion—5 hours. Prerequisite: course 3 or consent of instructor. Development and refinement of grammar, composition, and language skills required for reading literary texts and conversing about contemporary topics at an advanced level. History of the Hebrew language. Not open to students who have taken courses 100 or 100A.—I. (I.) Raab

22. Intermediate Modern Hebrew II (5)
Lecture/discussion—5 hours. Prerequisite: course 21 or consent of instructor. Continued development and refinement of grammar, composition, and language skills required for reading literary texts and conversing about contemporary topics at an advanced level. History of the Hebrew language. Not open to students who have taken course 101 or 100B.—II. (II.) Raab

23. Intermediate Modern Hebrew III (5)
Lecture/discussion—5 hours. Prerequisite: course 22 or consent of instructor. Continued development and refinement of grammar, composition, and language skills required for reading literary texts and conversing about contemporary topics at an advanced level. History of the Hebrew language. Further development of writing and translating skills. Not open to students who have taken course 100C or 102.—III. (III.) Raab

Upper Division Courses

100AN. Advanced Modern Hebrew I (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 23 or consent of instructor. Students who have taken course 100A as 2nd year Hebrew may take course 100AN. Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing.—I. (I.)

100BN. Advanced Modern Hebrew II (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 100AN or consent of instructor. Students who have taken course 100B as 2nd year Hebrew may take course 100BN. Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing.—II. (II.) Raab

100CN. Advanced Modern Hebrew III (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 100BN. Students who have taken course 100C as 2nd year Hebrew may take course 100CN. Third year Hebrew. Advanced grammar and composition. Focus on reading of literary texts, oral skills and accuracy in writing.—III. (III.)

Courses in Hindi (HIN)

Lower Division Courses

1. Elementary Hindi/Urdu I (5)
Lecture/discussion—5 hours. An introduction to Hindi and Urdu in which students will learn vocabulary and grammar in both Devanagari and Urdu scripts, and will practice skills in reading, writing, speaking and listening.—I. (I.) Good

2. Elementary Hindi/Urdu II (5)
Lecture/discussion—5 hours. Prerequisite: course 1. An introduction to Hindi and Urdu in which students will learn vocabulary and grammar in both Devanagari and Urdu scripts, and will practice skills in reading, writing, speaking and listening.—II. (II.) Good

3. Elementary Hindi/Urdu III (5)
Lecture/discussion—5 hours. Prerequisite: course 2. An introduction to Hindi and Urdu in which students will learn vocabulary and grammar in both Devanagari and Urdu scripts, and will practice skills in reading, writing, speaking and listening.—III. (III.) Good

21. Intermediate Hindi/Urdu (5)
Lecture/discussion—5 hours. Prerequisite: course 3. An intermediate level course for students who have completed Elementary Hindi/Urdu or the equivalent. Students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu.—I. (I.) Good

22. Intermediate Hindi/Urdu II (5)
Lecture/discussion—5 hours. Prerequisite: course 21. An intermediate level course where students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu.—II. (II.) Good

23. Intermediate Hindi/Urdu III (5)
Lecture/discussion—5 hours. Prerequisite: course 22. An intermediate level course where students will continue to practice their skills in listening, speaking, reading and writing in Hindi and Urdu.—III. (III.) Good

Courses in Latin (LAT)

Lower Division Courses

1. Elementary Latin (5)
Lecture—5 hours. Introduction to basic grammar and vocabulary and development of translation skills with emphasis on Latin to English. (Students who have successfully completed Latin 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)—I. (I.) Bulman, Rundin

2. Elementary Latin (5)
Lecture—5 hours. Prerequisite: course 1. Continuation of course 1.—II. (II.) Rundin

3. Intermediate Latin (5)
Lecture—5 hours. Prerequisite: course 2. Continuation of course 2. Selected readings from Latin authors.—III. (III.) Rundin

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100N. Readings in Latin Prose (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3. Review of basic forms, grammar, and vocabulary. Readings in prose authors, including Julius Caesar. Not open for credit to students who have completed course 110. GE credit: ArtHum, Wrt.—I. (I.) Stem

101. Livy (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.—(III.) Stem

102. Roman Comedy (5)
Lecture—4 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.—(II.) Albu

103. Vergil: Aeneid (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.—II. Albu, Seal

104. Sallust (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.—III. Stem

105. Catullus (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.—(III.) Seal, Watanabe

106. Horace: Odes and Epodes (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.—(III.) Albu, Seal

108. Horace: Satires and Epistles (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

109. Roman Elegy (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

110N. Ovid (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3. Translation and discussion of selected readings from the works of Ovid. May be repeated one time for credit when topic differs and with consent of instructor. Offered in alternate years. GE credit: ArtHum, Wrt.—(II.) Albu, Seal, Watanabe

111. Silver Age Latin (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Selections from Tacitus, Pliny, Petronius, Juvenal, Martial, and other writers of the Silver Age. Offered in alternate years. GE credit: ArtHum, Wrt.—Albu, Seal, Stem

112. Cicero: Political Writings (4)
Recitation—3 hours; term paper. Prerequisite: course 3. GE credit: ArtHum, Wrt.—(III.) Stem

114. Cicero: Philosophical Works (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.—Stem

115. Lucretius (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.—(II.)

116. Vergil: Eclogues and Georgics. (4)
Lecture—3 hours; term paper. Prerequisite: course 3. Offered in alternate years. GE credit: ArtHum, Wrt.

121. Prose Composition (5)
Lecture—4 hours; term paper.—Watanabe

125. Medieval Latin (4)
Lecture—3 hours; term paper. Prerequisite: course 3 and two upper division courses in Latin. Selected readings from the Vulgate and various medieval authors provide an introduction to the developments in the Latin Language and literature from the fourth to the fifteenth centuries. Offered in alternate years. GE credit: ArtHum, Wrt.—(I.) Albu, Traill

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Clinical Nutrition

(College of Agricultural and Environmental Sciences)

Faculty

See the Department of Nutrition, on page 440.

The Major Program

The Clinical Nutrition major provides students with training in normal and therapeutic nutrition, biological and social sciences, food science, communication, business management and food service management. This major fulfills the academic requirements for admission into a dietetics internship or the equivalent, which must be completed before qualifying for registration as a dietitian.

The Program. The Clinical Nutrition major (formerly Dietetics) includes the same basic core of nutrition classes as the Nutrition Science major, but includes additional courses such as food service management, education, sociology, and communication skills to prepare for work with the public. Clinical Nutrition students spend the first two years completing preparatory course work in the basic biological sciences, along with several of the social sciences. In the final two years, students take courses in normal and clinical nutrition, food science, biochemistry, and management techniques.

Entering freshman or transfer students are assumed to have basic computer skills and to demonstrate mathematics competency adequate to pass the Precalculus Diagnostic Examination with a minimum score of 27, or have taken calculus at a community college or other four-year institution.

Career Alternatives. The Clinical Nutrition major qualifies students to apply for a dietetic internship accredited by the Commission for Accreditation of Dietetics Education enabling them to become a Registered Dietitian, the professional credential necessary to work in a clinical setting. Once dietitians are registered, they generally seek employment in administrative, therapeutic, teaching, research, or public health/public service positions in clinics, hospitals, schools, or other similar institutions. There is a growing role for dietitians working in settings outside of the traditional hospital (for example, in state and federal nutrition programs, nutrition education, Peace Corps and Cooperative Extension work). Students who complete the undergraduate preparation in clinical nutrition are also qualified to enter graduate programs in dietetics, nutrition science, public health nutrition, and food service management.

B.S. Major Requirements:

	UNITS
Written/Oral Expression	**8**
English 3 or University Writing Program 1	4
Communication 1	4
Preparatory Subject Matter	**46-47**
Biological Sciences 2A & 2B	9
Chemistry 2A, 2B, 2C, 8A, 8B	21
Economics 1A or 1B	4
Psychology 1	4
Sociology 1 or 3 or Anthropology 2	4-5
Statistics 13	4
Depth Subject Matter	**84**
Agricultural and Resource Economics 112	4
Animal Biology 102 and 103	10
Biological Sciences 101	4
Food Science and Technology 100A, 100B, 101A, 101B, 108	15
Food Service Management 120, 120L, 122	8
Microbiology 101	5
Nutrition 111AV, 111B, 112, 116A, 116AL, 116B 116BL, 118, and 190	25
Neurobiology, Physiology, and Behavior 101, 101L	8
Additional upper division Nutrition electives	4
Total Units for the Major	**138**

Major Adviser. A.J. Clifford *(Nutrition)*

Advising Center for the major is located in 3211 Meyer Hall (530) 752-2512.

Graduate Study. See Graduate Studies, on page 109.

Clinical Nutrition and Metabolism

See Internal Medicine (IMD), on page 396.

Clinical Psychology

See Medicine, School of, on page 380.

Clinical Research (A Graduate Group)

Cameron Carter, M.D., Chairperson of the Group

Group Office. CTSC, 2921 Stockton Blvd., Sacramento, CA 95817 (916) 703-9124

Faculty

Timothy Albertson, M.D., Ph.D. *(Internal Medicine: Pulmonary and Critical Care Medicine)*
Laurel Beckett, Ph.D. *(Public Health Sciences)*
Lars Berglund, M.D., Ph.D. *(Internal Medicine: Endocrinology, Clinical Nutrition, and Vascular Medicine)*
Richard Bold, M.D. *(Surgery: Oncology)*
Cameron Carter, MMBS *(Psychiatry and Behavioral Sciences)*
Fitz-Roy Curry, Ph.D. *(Physiology and Membrane Biology)*
Charles DeCarli, M.D. *(Neurology)*
Ralph deVere White, M.D. *(Urology)*
Jose Galvez, M.D. *(Pathology & Laboratory Medicine)*
Randi Hagerman, M, FAAP *(Pediatrics)*
Ladson Hinton, M.D. *(Psychiatry and Behavioral Sciences)*
Jesse Joad, M.D. *(Pediatrics: Pulmonary)*
Richard Kravitz, M.D., MSPH *(Internal Med)*
Nancy Lane, M.D. *(IM: General Medicine)*
Jerold Last, Ph.D. *(IM: Pulmonary and Critical Care Medicine)*
Stephen Mc Curdy, M.D., MPH *(Public Health Sciences)*
Fred Meyers, M.D. *(Internal Medicine: Hematology and Oncology)*
David Pleasure, M.D. *(Neurology)*
Richard Pollard, M.D. *(Internal Medicine: Infectious and Immunologic Diseases)*
Claire Pomeroy, M.D., MBA *(Internal Medicine: Infectious and Immunologic Diseases)*
Peter Yellowlees, MBBS *(Psychiatry and Behavioral Sciences)*

Graduate Study. The Mentored Clinical Research Training Program (MCRTP) is an interdisciplinary graduate group in clinical research with a Master of Advanced Study degree in Clinical Research. The MCRTP provides a solid clinical/translational, patient-oriented research foundation for junior faculty, clinical and pre-clinical fellows, and post-doctoral scholars. The program centers around three core elements: didactic instruction, mentored research, and special experiences:

Mandatory course work includes biostatistics, epidemiology, patient-oriented research, health services research, data management/informatics, scientific communication, research management, responsible conduct of research and career development. The instruction includes a 12-week summer curriculum followed by a two-year core curriculum and electives that can be tailored to best meet each scholars career development needs.

Degree Offered. M.A.S. Plan II

Requirements:

Candidates must meet the following minimum requirements:

Completed one of the following degrees: M.D., D.D.S., D.M.D., O.D., N.D., D.O., Pharm.D., D.V.M., Ph.D. or D.N.S. in nursing.
High level of interest and potential to pursue innovative pre-clinical/translational or clinical research as a major focus of career plan, and a long-term goal of entering clinical research career.
Submission of an application: 2-4 page research proposal, Description of training plan with identified mentor, Curriculum vitae.
Letters of support from the prospective mentor and Department Chair, and commitment of release time from the candidates' department chair or division chief is also required.
Personal Interview.

Communication

(College of Letters and Science)

George A. Barnett, Chairperson of the Department

Department Office. 175 Kerr Hall; (530) 752-9933

Faculty

George A. Barnett, Ph.D., Professor
Robert A. Bell, Ph.D., Professor
Charles R. Berger, Ph.D., Professor
Jaeho Cho, Ph.D., Assistant Professor
Bo Feng, Ph.D., Assistant Professor
Mikayla Jenkins, Ph.D., Assistant Professor
Hyunseo Hwang, Ph.D., Assistant Professor
Michael T. Motley, Ph.D., Professor
Nicholas A. Palomares, Ph.D., Associate Professor
Laramie Taylor, Ph.D., Assistant Professor
Narine Yegiyan, Ph.D., Assistant Professor

Emeriti Faculty

Rina Alcalay, Ph.D., Professor Emerita
James J. Murphy, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Ralph S. Pomeroy, Ph.D., Professor Emeritus
John L. Vohs, M.A., Senior Lecturer Emeritus

Affiliated Faculty

Virginia O. Hamilton, Ph.D., Lecturer
Catherine Puckering, M.A., Lecturer
Alisa Shubb, M.A., Lecturer
John Theobald, M.A., Lecturer

The Major Program

The major in communication focuses upon human symbolic behavior in interpersonal and mediated contexts.

The Program. The program of study in communication examines communication processes at several different levels of analysis. Courses dealing with communication at the individual, interpersonal, organizational and societal levels of analysis are offered. Classes addressing such topics as communication and cognition, message systems, interpersonal communication, nonverbal communication, communication and persuasion, organizational communication, mass media effects and public communication campaigns explore communication at these levels of analysis. Related social science courses are also part of the major.

Preparatory Requirements. Before declaring a major in communication, students must complete the following courses with a combined grade point average of at least 2.500 at the University of California (at least 3.000 GPA may be required for similar courses taken at community college). All courses must be taken for a letter grade:

Anthropology 4 or Linguistics 1.....4 units
Psychology 1.....4 units
Sociology 1.....5 units
Statistics 13.....4 units

Career Alternatives. Communication graduates have found careers in such fields as broadcast and print journalism, administration, sales, management, politics and government, education, social work, and public relations. A communication degree is also excellent preparation for law school or other graduate programs.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**21**
Anthropology 4 or Linguistics 1	4
Communication 1 or 3	4
Psychology 1	4
Sociology 1	5
Statistics 13	4
Depth Subject Matter	**44**
Communication 101	4
Communication 102, 134, 141	12
Select one of Communication 103 or 105 or 135	4
Select one of Communication 140 or 142 or 143 or 144 or 146 or 152 or 165 or 170	4
Select five of the following additional courses (the five courses must be other than those chosen to fulfill the above requirements)	20
Communication 103, 105, 135, 136, 138, 140, 142, 143, 144, 146, 152, 165, 170, 172, 180, 189A, 189B, 189C, 189D, Anthropology 117, 120, Linguistics 160, 163, 171, 173, Political Science 164, 165, Psychology 132, Sociology 126, 128, 135, 148	
Total Units for the Major	**65**

Grading recommendation. Although not required, it is recommended that all courses offered in satisfaction of the major, except variable-unit courses, be taken for a letter grade.

Major Advisers. Faculty; contact department.

Advising Office. 179 Kerr Hall

Minor Program Requirements:

	UNITS
Communication	**24**
One course from Communication 1, 3	4
At least five upper division courses in communication	20

Graduate Study. The Department of Communication offers programs of study and research leading to the M.A. degree in Communication. Detailed information may be obtained from the Graduate Adviser, Department of Communication.

Graduate Adviser. N. Palomares

Courses in Communication (CMN)

Students must have satisfied the Subject A requirement before taking any course in Communication.

Lower Division Courses

1. Introduction to Public Speaking (4)
Lecture—1 hour; discussion—3 hours. Practice in the preparation and delivery of speeches based on contemporary principles and strategies of informing and persuading audiences. GE credit: Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).—I, II, III. (I, II, III.) Shubb

3. Interpersonal Communication Competence (4)
Lecture—2 hours; discussion—2 hours. Communication in interpersonal contexts. Sender, receiver, and message variables, and their interaction with communication competence. Participation in simulations and experiential exercises.—I, II, III. (I, II, III.) Hamilton

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Communication Theories (4)
Lecture/discussion—4 hours. Examination of the forms, functions, development, and testing of theory in the social sciences. Survey and comparison of significant micro and macro theories and models of human communication. Application of theories to real world problems. Not open for credit to students who have completed course 114. GE credit: SocSci.—I, II, III. Feng, Puckering

102. Empirical Methods in Communication (4)
Lecture—4 hours. Prerequisite: course 101 or 114, Statistics 13 or the equivalent. Survey of social scientific research methods commonly employed in the communication discipline. Topics include research design, measurement, sampling, questionnaire construction, survey research, experimental research, content analysis, and interaction analysis. Not open for credit to students who have completed course 115.—I, II, III. Bell, Jenkins

103. Gender Differences in Communication (4)
Lecture—4 hours. Prerequisite: upper division standing in Communication. Examination of communication differences between men and women as sources of male/female stereotypes, misunderstandings, dilemmas, and difficulties (real and imagined). Treatment of genders as cultures. Topics include male/female differences in discursive practices and patterns, language attitudes, and relationship dynamics. GE credit: SocSci.—I, II. Palomares

105. Semantic and Pragmatic Functions of Language (4)
Lecture—4 hours. Prerequisite: course 115. The role of language in shaping attitudes and perceptions of self and others. The use and abuse of verbal symbols in communicative situations. Concepts of meaning in discourse. GE credit: SocSci.—II, III. Hamilton

134. Interpersonal Communication (4)
Lecture—4 hours. Prerequisite: course 1 or 3, or the equivalent. Communication between two individuals in social and task settings. One-to-one communication, verbal and nonverbal, in developing relationships. Consideration of theory and research on relevant variables such as shyness, self-disclosure, reciprocity, games, and conflict. GE credit: SocSci.—I, II, III. Berger, Puckering

135. Nonverbal Communication (4)
Lecture—4 hours. Examination of the interaction between nonverbal communication and verbal communication channels in influencing outcomes in interpersonal and mass mediated communication contexts. Underlying functions served by nonverbal communication will also be considered. GE credit: SocSci, Div.—I, II, III. Berger

136. Organizational Communication (4)
Lecture—4 hours. Examines communication in various organizational situations. Focuses on the use of effective communication strategies for achieving organizational and individual goals. Emphasis is placed on identifying and amending ineffective communication within organizations. GE credit: SocSci.—I, II. Hamilton

138. Communication and Cognition (4)
Lecture/discussion—4 hours. Prerequisite: upper division standing. Relationship between communication and cognition. Models of discourse comprehension and production, the influence of language attitudes on social judgments, and the effects of information processing on decision making are explored. GE credit: SocSci.—I, II, III. Yegiyan

140. The Media Industry (4)
Lecture/discussion—4 hours. Examines the economic, social, and political forces that shape media content. Topics include the historical evolution of the print and broadcast media; emerging technologies,

including the Internet and interactive media; the globalization of the industry; patterns of media ownership. GE credit: SocSci—I, II, III. Theobald

141. Media Effects: Theory and Research (4)
Lecture/discussion—4 hours. Prerequisite: course 115 or the equivalent; course 140 recommended. Social scientific studies of the effects of mass media messages on audience members' actions, attitudes, beliefs, and emotions. Topics include the cognitive processing of media messages, television violence, political socialization, cultivation of beliefs, agenda-setting, and the impact of new technologies. GE credit: SocSci.—I, II, III. Hwang, Taylor

142. News Policies, Practices and Effects (4)
Lecture—4 hours. Exploration of processes and constraints in the gathering, editing, and reporting of news. Examination of studies on the effects of news, contemporary challenges to news reporting presented by new technologies, and the relationship of news to other social institutions. GE credit: SocSci.—I, II, III. Theobald

143. Analysis of Media Messages (4)
Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: courses 140 and 141 recommended. Examination of alternative approaches to the analysis, interpretation, and evaluation of media messages, including those disseminated through broadcasting, print, and new technologies. Both content analytic and interpretive approaches covered. GE credit: SocSci, Wrt.—I, II, III.

144. Media Entertainment (4)
Lecture/discussion—4 hours. Prerequisite: course 102; course 141 recommended. Effects and appeal of media entertainment, emphasizing emotional reactions. Topics include key concepts of entertainment research such as mood management, and the respective features and emotional/social-psychological effects of genres such as comedy, mystery, thriller, sports, music, horror, and erotica.—III. (III.) Taylor

146. Communication Campaigns (4)
Lecture/discussion—3 hours; term paper. Strategic uses of media and interpersonal communication channels in health, environmental advocacy, and political campaigns. Emphasis is on general principles relevant to most campaign types, including public information, social marketing, and media advocacy campaigns. Not open for credit to students who have completed course 160. GE credit: SocSci.—I, III. Theobald

152. Theories of Persuasion (4)
Lecture—4 hours. Prerequisite: course 115. Survey of communication and social psychological theories of persuasion. Examination of influence tactics and message design. Contexts of application include product advertising, propaganda campaigns, and health promotion. GE credit: SocSci.—I, II, III. Bell, Jenkins

161. Health Communication (4)
Lecture/discussion—4 hours. Prerequisite: course 102 or equivalent course in research methods. Survey of health communication theories and research. Review of research on health literacy, social support and coping, doctor-patient interaction, health communication campaigns, and media influences on health. Examination of the application of new communication technologies in health promotion.—III. (III.) Bell

165. Media and Health (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 115 or the equivalent. Content and effects of messages in news, entertainment, and advertising. Topics include health news reporting; portrayals of disease, disability, death and health-related behaviors; representations of health professionals; promotion of drugs and other health products; tobacco and alcohol advertising. GE credit: SocSci.—I, III. Taylor

170. Communication, Technology, and Society (4)
Lecture/discussion—4 hours. Prerequisite: course 114, 115, and upper division standing. Survey of how communication technologies transform our lives at the individual and society levels. Topics include human-computer interaction; the effects of communication technologies in education, health and business; and social and political implications of technological development. GE credit: SocSci.—I. II. Theobald

172. Computer-Mediated Communication (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101 and 102. Uses and impacts of computer-mediated communication. Theories and research findings pertaining to how computer-mediation affects various aspects of human interaction including impression formation, development of personal relationships, group decision making, collaborative work, and community building.—II, III.

180. Current Topics in Communication (4)
Seminar—4 hours. Prerequisite: upper division standing with a major in Communication or consent of instructor. Group study of a special topic in communication. May be repeated one time for credit. Enrollment limited.

189A. Proseminar in Social Interaction (4)
Seminar—3 hours; term paper. Prerequisite: course 114 and 115. Reading, discussion, research, and writing on a selected topic in the specialty of social interaction. Potential topics include relationship initiation, maintenance, and deterioration; communication failure; nonverbal communication; conversational management; semantics and pragmatics of language; and family/marital communication. May be repeated for credit when topic differs. Offered in alternate years. GE credit: SocSci, Wrt.—III. Barnett, Palomares

189B. Proseminar in Mass Communication (4)
Seminar—3 hours; term paper. Prerequisite: course 114 and 115. Reading, discussion, research, and writing on a selected topic in the specialty of mass communication. Potential topics include, agenda-setting, the cultivation of beliefs, television violence, media portrayals of underprivileged groups, mediated political discourse, interactive technologies, and international/global communications. May be repeated for credit when topic differs. Offered in alternate years. GE credit: SocSci, Wrt.—I. Hwang

189C. Proseminar in Health Communication (4)
Seminar—3 hours; term paper. Prerequisite: course 114 and 115. Reading, discussion, research, and writing on a selected topic in health communication. Potential topics include health communication design and evaluation, media advocacy, physician-patient interaction, uses of communication technologies in health settings, and health-related advertising. May be repeated for credit when topic differs. Offered in alternate years. GE credit: SocSci, Wrt.

189D. Proseminar in Organizational Communication (4)
Seminar—3 hours; term paper. Prerequisite: course 114 and 115. Reading, discussion, research, and writing on a selected topic in the specialty of organizational communication. Potential topics include power and influence, organizational conflict and its resolution, mediation, bargaining and negotiation, superior-subordinate interaction, leadership styles, and inter-organizational communication. May be repeated for credit when topic differs. Offered in alternate years. GE credit: SocSci, Wrt

192. Internship in Communication (1-6)
Internship—3-18 hours. Prerequisite: communication major who has completed 20 units of upper division communication courses. Supervised work experience requiring the application of communication principles and strategies or the evaluation of communication practices in a professional setting. Relevant experiences include public relations, advertising, sales, human resources, health promotion, political campaigns, journalism, and broadcasting. May be repeated up to 6 units of credit. (P/NP grading only.)

194H. Senior Honors Thesis (4)
Seminar—1 hour; individual tutoring on research project—3 hours. Prerequisite: senior standing and approval by Honors Committee. Directed reading, research, and writing culminating in the preparation of honors thesis under direction of faculty adviser.

197T. Tutoring in Communication (2-4)
Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing with major in Communication and consent of Department Chairperson. Tutoring in undergraduate Communication courses, including leadership of discussion groups affiliated with departmental courses. May be repeated for credit up to a total of six units. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

201. Theoretical Perspectives on Strategic Communication (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Explores the intentional use of discourse and nonverbal behavior to reach goals. Explores theories and models that elucidate the processes that enable the realization of intentions in message plans and discourse.—I. (I.) Berger

202. Communication Theory Construction (4)
Seminar—4 hours. Prerequisite: consent of instructor; graduate standing. Alternative meta-theoretical perspectives for theory generation in communication inquiry. Processes of construct explication, operationalization and theory construction. Emphasis on the critique of extant communication theories and the development of theory construction skills. Not offered every year.—III.

210. Experimental Methods and Analysis in Communication (4)
Lecture—4 hours. Prerequisite: graduate standing; one course in inferential statistics; consent of instructor. Experimental designs in communication. Topics include: causation; threats to validity; conceptualization, operationalization, and measurement; hypothesis testing; ethics; data analysis software focusing on the analysis of variance and planned contrasts; and the practical and effective implementation and writing of experiments.—I. (I.) Palomares

211. Survey Research Methods in Communication (4)
Seminar—4 hours. Prerequisite: graduate standing; one course in inferential statistics; consent of instructor. Methods for designing personal interview, phone, mail, and web-based surveys in communication. Topics include: sampling strategies, sources of error and bias in survey designs, questionnaire construction, cognitive interviewing, interviewer behavior, and analysis of complex survey data using standard software packages.—II. (II.) Bell

220. Persuasion Theories and Message Design (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Major social scientific theories and perspectives on attitude change and persuasion. Application of persuasion theories and principles to persuasive message design in applied contexts.—III. (III.) Hughes

221. Communication and Cognition (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Explores the cognitive structures and processes that enable the production, comprehension and interpretation of messages in face-to-face and mediated communication contexts. Explores the communication outcomes associated with these processes. Offered in alternate years.—(II.)

222. Risk Communication (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Theories and models of individual risk information processing. Media depictions of threats and risk-related information and their potential effects on audiences. Implications for the design and implementation of messages concerning threat and risk. Not offered every year.

230. Social Interaction Theory and Research (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Survey of theories and research on social interaction and interpersonal communication. Covers communication codes, individual differences in communication, communication and relationship development, family communication, conflict, cognitive and emotional processes underlying social interaction, social influence, intercultural communication, and nonverbal behavior.—II. (II.) Feng

231. Tactics of Interpersonal Influence (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Achievement of interpersonal goals in social interaction. Topics include message production; tactics, strategies and planning; anticipating potential obstacles; resisting and thwarting goals; plan recognition; and goal detection. Examined goals include compliance gaining, attitude change, ingratiation, information seeking, comforting, and deception. Offered in alternate years.—(III.)

244. Organizational Communication (4)
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on communication processes in organizations.

250. Mediated Communication Theory and Research (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Survey of major theories on the intended and unintended effects of mediated communication. Topics include media's effects on learning, political behavior, interpersonal violence, sexual socialization, consumer behavior, race relations, gender socialization, and cultural processes.—II. (II.) Taylor

251. Communication, Technology, and Society (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Transformation of life at the individual and societal levels by communication technologies. Topics include the digital divide, media convergence in news and entertainment, human-computer interaction, distance learning, electronic commerce, distributed work and e-democracy. Offered in alternate years.—(II.) Taylor

252. Computer-Mediated Communication (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. The effects of computer-mediated communication on the ways in which people express themselves, form impressions about strangers, develop and maintain relationships, collaborate on group work, and expand social network, especially in comparison to face-to-face communication. Offered in alternate years.—(III.)

253. Negotiation (4)
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on negotiating.

254. Communication Campaigns (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Strategic uses of media and interpersonal channels to promote social change through social marketing, information, and media advocacy campaigns. Focus on theory-based interventions in a variety of applied contexts. Offered in alternate years.—(II.)

260. Communication Applications (2-4)
Discussion—1 hour; supervised field work—3-9 hours. Prerequisite: course 220. Fieldwork in communication. Organization and implementation of a research project for a specific application of a communication program. May be repeated one time for credit. (S/U grading only.)

280. Special Topics in Social Interaction (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Reading, discussion, research, and writing on a selected topic in the specialty of social interaction. May be repeated for credit when topic differs. Not offered every year.

281. Special Topics in Mediated Communication (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Reading, discussion, research, and writing on a selected topic in the speciality of mediated communication. May be repeated for credit when topic differs. Not offered every year.—Yegiyan

282. Special Topics in Health Communication (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Reading, discussion, research and writing on a focused topic in health communication. May be repeated for credit when topic differs. (Same course as Epidemiology and Preventive Medicine 282). Not offered every year.—III.

283. Special Topics in Organizational Communication (4)
Seminar—4 hours. Prerequisite: graduate standing; consent of instructor. Reading, discussion, research, and writing on a selected topic in the specialty of organizational communication. May be repeated for credit when topic differs. Not offered every year.—Barnett

298. Group Study (1-5)
Lecture—3 hours. (S/U grading only.)

299. Individual Study (1-12)
(S/U grading only.)

299R. Thesis Research (1-12)
Independent study—3-36 hours. Prerequisite: graduate standing in Communication. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

Community and Regional Development

(College of Agricultural and Environmental Sciences)

Faculty. See the Department of Human and Community Development, on page 334.

The Major Program

The Community and Regional Development major (formerly Applied Behavioral Sciences) aims to provide a broad comparative understanding of theories, methodologies, and issues relevant to the study of communities and the people in them. The program focuses on the ways that economic, political and socio-cultural forces are transforming regions and local communities, and it considers how knowledge can be used to improve the quality of community life.

The Program. Principal subjects of study within the major are community and organizational development, social change processes, the role of culture and ethnicity in shaping community life, community research methodologies, the impacts of innovation and technology on community development, and the effects of social, economic and political systems on communities. The major is organized to allow students to develop fields of concentration that meet their career goals.

Internships and Career Alternatives. Community and Regional Development students are required to complete an internship in their field before graduation. Internships have been arranged with local, county, and state planning units, health departments, schools, housing offices, and community education programs. Community and Regional Development graduates are prepared for occupations in community development, social research, program evaluation, organizational and educational consulting, city and regional planning, and for-profit organizations. The major also provides effective preparation for graduate or professional study in the social and behavioral sciences, or for professional degrees.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter.....22-25
Community and Regional Development 1, 2 8
Plant Sciences 21 or Computer Science Engineering 15.....3-4
Economics 1A or 1B..... 4
Anthropology 2 or Sociology 1 4-5
Statistics 13 or 32 or Sociology 46B.....3-4

Depth Subject Matter 39-40
Core Issues in Community Development:
Three courses from Community and Regional Development 142, 152, 153A or 153B or 153C, 164, 172, 176, or 180 12
Economics of Community Change:
Two courses from Community and Regional Development 118, 140, 141, 162, or International Agricultural Development 103 8
Political Processes and Community Change:
Two courses from Community and Regional Development 147, 149, 154, 157, 158, or 171 8
Methods for Community Research:
Two courses, including at least one *'d course from:
Community and Regional Development 151, *156, *Education 114, *Landscape and Architecture 150, *Sociology 103, *Sociology 106, *Statistics 102.... 7-8 units
**Note on substitutions: supplementary list of pre-approved substitutions available in Advising Office.
Internship: Community and Regional Development 192 4

Areas of Specialization

Take 20 units from each of two options or 40 units from one option. The Areas of Specialization must include two Community and Regional Development courses. Up to 4 units of variable-unit course work may be counted toward this requirement (e.g., Community and Regional Development 192).

Global Communities Option 40

Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.

Development Policy: Anthropology 122B, 126A, 135, Agricultural and Recourse Economics 115A, 115B, Community and Regional Development 140, 152, 153A, 153B, 153C, 164, 180, Economics 115A, 115B, 160A, 160B, 162, International Agricultural Development 170, Sociology 138, 139, 141, 145A, 159
Gender and Development: Sociology 132, 145, Anthropology 126B, Women and Gender Studies 102, 182
Globalization and Politics: Political Science 124, 130, 131, 178, 175
Experiential Learning, Area Studies, and Language: Total number of units of credit in Experiential learning, Area Studies, and Language courses cannot exceed 32.
Up to 12 credits transferred from any accredited foreign program or foreign internship, including UCD EAP and Summer Abroad programs.
Up to 12 credits in regional area studies classes (e.g., Middle East, China, Latin America).
Up to 12 credits for foreign Language.

Organization and Management Option.....40

Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.

Administration: Community and Regional Development 157, 158, 194HA and 194HB, Agricultural Economics 100A, 171A, Economics 115A, Political Science 100, 105, 142, 155, 183
Communication: Communication 134, 136, 140, 152, Community and Regional Development 147, 176, Education 120, 163
Human Resources: Community and Regional Development 151, 172, 176, Economics 151B, Sociology 120, 128, 129)
Management: Community and Regional Development 118, 140, 141, 154, 162, 164, 168, Agricultural Economics 112, 113, History 174A, Sociology 138, 139, 158, 159, 180A, 180B

Policy, Planning, and Social Services Option 40

Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.

General: Community and Regional Development 118, 142, 151, 153, 154, 156, 162, 176, 180, 194HA and 194HB, Environmental Science and Policy 165, Political Science 100, 105, 108, 109, 142, 154, 155, 183, Sociology 120, 140, 154, 155, 185
Community Health and Counseling: Communication 134, 135, 165, Community and Regional Development 164, Education 160, 163, Public Health Sciences 101, Environmental Science and Policy 126, Human Development 120, 121, 130, Psychology 123, 126, 151, 154, 162, 168, Sociology 154
Education and Community: Agricultural Education 100, 160, Communication 146, Education 100, 110, 120, 151, 152, 153, Psychology 100, 132, Sociology 124
Environmental Policy and Regional Planning: Community and Regional Development 140, 141, 149, 152, 158, 171, Economics 115A, Environmental Recourse Sciences 121, Environmental Science and Policy 110, 160, 161, 164, 166, 168A, 168B, 171, 172, 173, 179, Geography 155, Political Science 102, 107, 175, Sociology 102, 118, 138, 141, 143A, 143B, 170
Family and Community: American Studies 152, Community and Regional Development 147, Human Development 100A, 100B, 100C, 101, 102, 103, 110, 130, 140, 140L, 141, 142, 143, 160, 161, 162, Psychology 140, Sociology 122, 131, 134, 135, 152

English Composition Requirement 4

In addition to the College English Composition requirements, choose one from the University Writing Program 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 102H, 104A, 104B, 104C, 104D, 104E, 104F 4

Total Units for Major 105-109

Major Adviser. M. Kenney

Advising Center for the major is located in 1303 Hart Hall (530) 752-2244.

Honors Program. An Honors Program available to Human and Community Development majors who have demonstrated excellence in their field of study. Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade point average of 3.500 in upper division courses counted toward the major. The program consists of a project whose specific nature is determined by consultation with the student's Honors Adviser. It may involve completion of a research project, a scholarly paper, a senior thesis, or some comparable assignment. The project will have a minimum duration of two quarters and will be noted on the student's record by a variable unit course number or special honors course designation. Successful completion of the honors program requires that a minimum of eight (8) units of credit be earned in course work for the project. It is expected that a student participating in the Honors Program of the Community Studies and Development will participate in the Undergraduate Research, Scholarship and Creative Activities Conference. Additionally, students participating in the Honors Program will be required to give a public presentation of their work in a departmental seminar program.

Honors Program Advisor. Frank Hirtz, *fwhirtz@ucdavis.edu*

Minor Program Requirements:

The Community and Regional Development faculty offers the following minor program:

UNITS

Community Development 24

Community and Regional Development 1 4
Five courses selected from Community and Regional Development 140, 141, 142, 147, 149, 151, 154, 156, 157, 158, 162, 164, 172, 176, 180 20

Minor Adviser. M. Kenney

Graduate Study. See Graduate Studies, on page 109.

Related Courses. See Environmental Science and Policy 10, 101, 133.

Courses in Community and Regional Development (CRD)

Lower Division Courses

1.The Community (4)
Lecture—3 hours; discussion—1 hour. Basic concepts of community analysis and planned social change. The dynamics of community change through case studies of communities including peasant, urban ghetto, suburban mainline, and California farm workers. GE credit: SocSci, Div, Wrt.—I, II, III. (I, II, III.) Tarallo

2. Ethnicity and American Communities (4)
Lecture—3 hours; discussion—1 hour. Historical and cultural survey of the role of various ethnic groups in the development of American communities. Examines ethnicity as a cultural factor, ethnicity as power and issues related to selected American ethnic groups. GE credit: SocSci, Div, Wrt.—I, II. (I, II.) Lippin

20. Food Systems (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1. Social aspects of agri-food systems. Social science perspectives applied to food, agriculture, and sustainability in relation to power, labor, knowledge, technology, governance, and social movements. Discussions of specific commodity chains and their social and environmental effects in comparative global context.—I. (I.) Galt

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.).

98. Directed Group Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

118. Technology and Society (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 18 or consent of instructor. Impact of technology on labor relations, employment, industrial development and international relations. The internal relations of technology development and deployment. GE credit: SocSci, Wrt.—I. (I.) Kenney

140. Dynamics of Regional Development (4)
Lecture—4 hours. Prerequisite: one undergraduate social science course or consent of instructor. Political economy of domestic regional development. Technology, labor relations and interfirm linkages. California and other regions as case studies. GE credit: SocSci, Wrt.—II. (II.) Kenney

141. Organization of Economic Space (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. The globalization of economic activity focusing on new spatial patterns of production and circulation and their implications for particular countries and regions.—I. (I.) Benner

142. Rural Change in the Industrialized World (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Geography of rural environment with special emphasis on rural restructuring. The regional focus is on the developed world and comparisons are drawn between Europe (Eastern and Western) and North America.—II. (II.) Galt

151. Community Field Research: Theory and Analysis (4)
Lecture—4 hours; extensive writing; project. Prerequisite: course 1 and any upper division Community and Regional Development course are recommended. Emphasis on the design and analysis of community research considering the relationship between theory and practice. Study of community research methods, including structural analysis, elite interviewing, and ethnographic approaches. GE credit: SocSci, Div, Wrt.—III. (III.) Tarallo

152. Community Development (4)
Lecture—4 hours. Prerequisite: course 1 or 151, Sociology 2, Anthropology 2, Asian American Studies 100, Chicana/o Studies 132, Geography 5, or African American and African Studies 101 or consent of instructor. Introduction to principles and strategies of community organizing and development. Examination of non-profit organizations, citizen participation, approaches to reducing poverty, community needs assessment, and regional development strategies. GE credit: SocSci, Wrt.—I. Hirtz

153A. International Community Development: Asia (4)
Lecture—4 hours. Prerequisite: course 1, Anthropology 2, International Agricultural Development 10. Examination and analysis of community development efforts in Japan and the impact of global forces in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. Course is based in Kyoto, Japan, and includes field trips. GE credit: SocSci, Div.—Fujimoto

153B. International Community Development: Europe (4)
Lecture—4 hours. Prerequisite: course 1 or 2, Anthropology 2, International Agricultural Development 10; course 164 or the equivalent recommended. Examination and analysis of community development efforts in Europe and the impact of global forces in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. Course is based in Freiburg, Germany, and includes field trips to France and Switzerland. GE credit: SocSci, Div.—Hirtz

154. Social Theory and Community Change (4)
Lecture—4 hours. Prerequisite: course 1, Sociology 1, or Anthropology 2. A comparative overview of the dominant social science paradigms for the study of community development and change. Among the paradigms discussed are functionalism, conflict theory/Marxism, structuralism, and methodological individualism. GE credit: SocSci, Div, Wrt.—II. (II.) Hirtz

156. Community Economic Development (5)
Lecture—4 hours; laboratory—2 hours. Prerequisite: Plant Sciences 21 or Engineering Computer Sciences 15 and course 152 or consent of instructor. How low income communities work together to improve their economic well-being, increase their control over their economic lives, and build community power

and decision-making. Includes techniques to analyze community economic potential and identification of appropriate intervention tools. Group project.—II. (II.) Benner

157. Politics and Community Development (4)
Lecture—4 hours. Prerequisite: prior course work in sociology or political science recommended. Analyzes political, economic and sociocultural forces shaping the form and function of local communities in the U.S. Considers theories of the state, the community and social change and case studies of actual community development in comparative historical perspective. GE credit: SocSci, Div, Wrt.—II. Smith

158. Small Community Governance (4)
Lecture/discussion—3 hours; fieldwork—3 hours. Prerequisite: course 151 or 160 or Political Science 100. Governing institutions and political processes in rural and small urban places. Local government organization, community autonomy, leadership, political change, policy development, and select policy issues including public finance. Field research on political processes or policy issues in select communities. Offered in alternate years.—III. Campbell

162. People, Work and Technology (4)
Lecture—4 hours. Prerequisite: upper division standing; eight units of sociology, anthropology, or community and regional development. Relationship between work, technology, and people's lives. Such topics as industrialization, bureaucratization, automation, the structure of work-linked communities, education and the labor market, work and the economic system and the future of work.—I. (I.)

164. Theories of Organizations and Their Roles in Community Change (5)
Lecture—4 hours; laboratory—2 hours. Prerequisite: course 1 or 2 or other equivalent social science course and Statistics 13 or equivalent. Planned change within and through community organizations. Private voluntary organizations, local community associations, and local government. Relationship between community organizations and social capital. Collaborative original data gathering and professional report writing.—II. (II.) Hirtz

171. Housing and Social Policy (4)
Lecture—4 hours. Social impact, economics, and politics of housing in the United States. Special attention given to alternative policy strategies at the national and local levels.—III. Wiener

172. Social Inequality: Issues and Innovations (4)
Lecture—4 hours. Prerequisite: upper division standing; 8 units of sociology or anthropology or combination. Study of the phenomenon of inequality in the U.S. Various approaches to inequality examined, including structural and historical explanations, prejudice and discrimination, the "culture of poverty," and arguments concerning race, sex, and genetic potential.—III. (III.)

176. Comparative Ethnicity (4)
Lecture—4 hours. Prerequisite: upper division standing, 8 units of sociology or anthropology or combination. Exploration of the role of ethnicity in shaping social systems and interaction. Examination of analytical approaches to and issues arising from the study of ethnicity, through utilization of data from a range of different societies. GE credit: SocSci, Div, Wrt.—II. Guarnizo

180. Transnational Community Development (4)
Lecture/discussion—4 hours; extensive writing; project; term paper. Prerequisite: course 1, or Anthropology 2, or Sociology 1. The effects of grassroots, nonstate, non-corporate actors from abroad on local, national and international development. Socioeconomic, political, and cultural implications of transnational actions undertaken by international nongovernmental organizations, individual migrants, and migrant grassroots civic organizations. GE credit: SocSci.—III. (III.) Guarnizo

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

240. Community Development Theory (4)
Lecture/discussion—4 hours. Introduction to theories of community development and different concepts of community, poverty, and development. Emphasis on building theory, linking applied development techniques to theory, evaluating development policy, and examining case studies of community development organizations and projects.—I. (I.) Hirtz

241. The Economics of Community Development (4)
Seminar—4 hours. Prerequisite: graduate standing. Economic theories and methods of planning for communities. Human resources, community services and infrastructure, industrialization and technological change, and regional growth. The community's role in the greater economy.—I. Kenney

242. Community Development Organizations (4)
Seminar—4 hours. Prerequisite: course 240. Theory and praxis of organizations with social change agendas at the community level. Emphasis on nonprofit organizations and philanthropic foundations.—III. (III.) Hirtz

242S. Community Development Organizations (International) (4)
Fieldwork—10 hours; lecture—5 hours; workshop—5 hours. Prerequisite: course 240. Theory and praxis of organizations with social change agendas at the community level. Emphasis on local governance, non-profit organizations and philanthropic foundations at an international level. Limited enrollment.—IV. (IV.) Hirtz

244. Political Ecology of Community Development (4)
Lecture—4 hours. Prerequisite: graduate standing. Community development from the perspective of geographical political ecology. Social and environmental outcomes of the dynamic relationship between communities and land-based resources, and between social groups. Cases of community conservation and development in developing and industrialized countries.—II. (II.) Galt

245. The Political Economy of Urban and Regional Development (4)
Lecture—4 hours. Prerequisite: course 157, 244, or the equivalent. How global, political and economic restructuring and national and state policies are mediated by community politics; social production of urban form; role of the state in uneven development; dynamics of urban growth and decline; regional development in California.—III. (III.) Smith

246. The Political Economy of Transnational Migration (4)
Lecture—4 hours. Prerequisite: graduate standing. Theoretical perspectives and empirical research on social, cultural, political, and economic processes of transnational migration to the U.S. Discussion of conventional theories will precede contemporary comparative perspectives on class, race, ethnicity, citizenship, and the ethnic economy.—II. (II.) Guarnizo

247. Transformation of Work (4)
Lecture/discussion—4 hours. Prerequisite: graduate standing in history or social science degree program or consent of instructor. Exploration of the ways that the experience, organization, and systems of work are being reconfigured in the late twentieth century. The impacts of economic restructuring on local communities and workers.—III. (III.)

248. Social Policy, Welfare Theories and Communities (4)
Seminar—4 hours. Prerequisite: graduate standing. Theories and comparative histories of modern welfare states and social policy in relation to legal/normative, organizational, and administrative aspects. Analysis of specific social issues within the U.S./California context. Not open for credit to students having completed course 248A and 248B. Offered in alternate years.—(III.) Hirtz

248A. Social Policy, Welfare Theories and Communities I (2)
Seminar—2 hours. Prerequisite: graduate standing. Theories and comparative histories of modern welfare states. Theories of welfare and social policy in relation to normative, organizational, and administrative aspects of welfare and social policy. Offered in alternate years.—Hirtz

248B. Social Policy, Welfare Theories and Communities II (2)
Seminar—2 hours. Prerequisite: graduate standing, course 248A concurrently. Analysis of a specific set of social issues within the U.S./California context. Issues may include poverty, hunger, housing, health, family, disability, economic opportunity, affirmative action orientations, gender, old age, or special social groups. Offered in alternate years—Hirtz

290. Seminar (1)
Seminar—1 hour. Analysis of research in applied behavioral sciences. (S/U grading only.)—I. Hirtz

292. Graduate Internship (1-12)
Internship—3-36 hours. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. (S/U grading only.)

293. Community Development Graduate Proseminar (1)
Lecture/discussion—1 hour. Prerequisite: enrolled in Community Development graduate group; restricted to first year Community Development graduate students only. Introduction to graduate training in Community Development. Seminar designed to introduce students entering graduate work in the Community Development Graduate Group to its ongoing activities. (S/U grading only.)—I. (I.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Professional Courses

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

440. Professional Skills for Community Development (4)
Seminar—4 hours. Prerequisite: course 240. The intersection of theory and case studies to develop practical skills needed to work as a professional community developer, program administrator, and/or policy consultant.—II. (II.) Bradshaw

Community Development (A Graduate Group)

Chris Benner, Ph.D., Chairperson of the Group

Group Office. 1332 Hart Hall (Human and Community Development);
(530) 752-1926; *http://hcd.ucdavis.edu*

Faculty

Chris Benner, Ph.D., Associate Professor
(Human and Community Development)
Adela De La Torre, Ph.D., Professor
(Chicana/o Studies)
Jesse Drew, Ph.D., Associate Professor
(Techno-Cultural Studies)

Deborah Elliott-Fisk, Ph.D., Professor *(Wildlife, Fish, and Conservation Biology)*
Patsy Eubanks-Owens, M.L.A., Associate Professor *(Landscape Architecture)*
Yvette Flores-Ortiz, Ph.D., Professor *(Chicana/o Studies)*
Mark Francis, M.L.A., Professor *(Environmental Design)*
Ryan E. Galt, Ph.D., Assistant Professor *(Human and Community Development)*
Luis Guarnizo, Ph.D., Professor *(Human and Community Development)*
Susan Handy, Ph.D., Professor *(Environmental Science and Policy)*
Paul Heckman, Ph.D., Professor *(School of Education)*
Robin Hill, Ph.D., Associate Professor *(Art, Art History)*
Frank Hirtz, Ph.D., Associate Professor *(Human and Community Development)*
Carlos Jackson, M.F.A., Assistant Professor *(Chicana/o Studies)*
Susan B. Kaiser, Ph.D., Professor *(Textiles and Clothing)*
Martin Kenney, Ph.D., Professor *(Human and Community Development)*
David Kyle, Ph.D., Associate Professor *(Sociology)*
William Lacy, Ph.D., Professor, Vice Provost *(Human and Community Development, Outreach and International Programs)*
Jonathan London, Ph.D., Director, Assistant Professor *(Center for the Study of Regional Change)*
Mark Lubell, Ph.D., Associate Professor *(Environmental Sciences and Policy)*
Michael, McQuarrie, Ph.D., Assistant Professor *(Sociology)*
Elizabeth Miller, M.D., Ph.D., Assistant Professor *(UCDHS: Pediatrics)*
Deb Niemeier, Ph.D. Professor *(Civil and Environmental Engineering)*
Ben Orlove, Ph.D., Professor *(Environmental Sciences and Policy)*
Richard Pan, Ph.D., Associate Professor *(General Pediatrics)*
Dennis Pendleton, Ph.D., Dean *(UC Davis Extension)*
Michael Rios, Ph.D., Assistant Professor *(Environmental Design)*
Michael P. Smith, Ph.D., Professor *(Human and Community Development)*
Julie Sze, Ph.D., Assistant Professor *(American Studies)*
Tom Tomich, Ph.D., Professor *(Human and Community Development)*
Karen Watson-Gegeo, Ph.D., Professor *(School of Education) Distinguished Graduate Mentoring Award*
Steve Wheeler, Ph.D., Associate Professor *(Environmental Design)*
Diane Wolf, Ph.D., Professor *(Sociology)*

Affiliated Faculty

David Campbell, Ph.D., Associate Specialist in Cooperative Extension *(Human and Community Development)*
Joyce Gutstein, Ph.D., Director *(Public Service Research Program)*
Michael Lawler, Ph.D., Chair, Human Services *(UC Davis Extension)*
Jeff Loux, Ph.D., Director *(Land Use and Natural Resources, UC Davis Extension)*
Deborah Paterniti, Ph.D., Associate Adjunct Professor *(UCDHS: Center for Healthcare Policy and Research)*
Carolyn Penny, Ph.D., Director *(Common Ground/UC Davis Extension)*
Bernadette Tarallo, Ph.D., Lecturer *(Human and Community Development)*
Mark Van Horn, Director *(PSTC/SF)*

Emeriti Faculty

Stephen Brush, PH.D., Professor Emeritus *(Human and Community Development)*
Isao Fujimoto, M.A., Lecturer SOE Emeritus
James I. Grieshop, Ph.D., Specialist in Cooperative Extension Emeritus *(Human and Community Development)*
Janet D. Momsen, Ph.D., Professor Emerita *(Human and Community Development)*
Alvin D. Sokolow, Ph.D., Extension Specialist Emeritus *(Human and Community Development)*
Geoffrey A. Wandesforde-Smith, Ph.D., Associate Professor Emeritus *(Political Science, Environmental Science and Policy)*
Miriam J. Wells, Ph.D., Professor Emerita *(Human and Community Development)*

Graduate Study. The Graduate Group in Community Development offers a multidisciplinary program of study which leads to the M.S. degree. The program helps students link conceptual knowledge with cutting edge practical experience so they can influence the social, economic, cultural and political forces that affect the well-being of people living in community settings whether small towns or large cities, whether in the Unites States or elsewhere in the world. Graduate study in community development also prepares individuals to work within government or non-profit organizations in the realm of social and economic change, or to prepare them for further doctoral studies in related programs. Particular strengths of the program include: urban political development and change; sustainable agriculture and food systems; community organizing and organizations in under-served communities; community economic development; environmental conservation and planning; local impacts of globalization and trans-nationalism.

Preparation. Applicants to this program can prepare themselves by enrolling for upper division courses in the social or behavioral sciences, e.g., anthropology, economics, sociology, psychology, geography, urban studies or political science, and courses in community studies.

Graduate Advisers. Contact the Group office.

Community Nutrition

See Nutrition Science, on page 444.

Comparative Literature

(College of Letters and Science)

_____, Chairperson of the Department

Department Office. 213 Sproul Hall; (530) 752-1219; *http://complit.ucdavis.edu*

Faculty

Gail Finney, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Neil Larsen, Ph.D., Professor
Kari Lokke, Ph.D., Professor
Sheldon Lu, Ph.D., Professor
Noha Radwan, Ph.D. Assistant Professor
Seth L. Schein, Ph.D., Professor
Juliana Schiesari, Ph.D., Professor
Brenda Schildgen, Ph.D., Professor
Jocelyn Sharlet, Ph.D., Assistant Professor
Archana Venkatesan, Ph.D., Assistant Professor

Emeriti Faculty

Ruby Cohn, Ph.D., Professor Emerita
Manfred Kusch, Ph.D., Senior Lecturer Emeritus
Robert M. Torrance, Ph.D., Professor Emeritus

Affiliated Faculty

Patricia Mackinnon, Ph.D., Lecturer
Scott McLean, Ph.D., Lecturer

The Major Program

Comparative Literature is a dynamic major whose own self-definition is constantly shifting. Once mostly limited to the study of western European literature and its Greco-Roman classical past, today Comparative Literature has become a global interdisciplinary study of literature in original languages and other media (including cinema, television, fine arts, and opera, for example). Thus, we can define Comparative Literature as the study of literature and culture across national boundaries and throughout time.

The Program. Both the major programs and the minor programs in Comparative Literature allow students to combine courses in one or more national literature departments with courses in Comparative Literature. The introductory course sequence (COM 1-4) provides both an overview of ancient to contemporary literature and film and offers intensive practice in analytical thought. In addition, any one of the courses in the sequence satisfies the university composition requirement. All readings in undergraduate Comparative Literature courses are in English, but majors take upper division courses in at least one foreign literature in the original language.

Career Alternatives. A Comparative Literature major offers an excellent enhancement to pre-professional training, preparing students for graduate study in medicine, dentistry, veterinary medicine, and other science fields as well as law and business, besides of course journalism and publishing, teaching, or graduate study in literature.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 16-46

Comparative Literature 1 or 2; 3 or 4 8
Two other lower division courses in Comparative Literature (selected from 1-53C excluding the 10 series. Cannot include the two required courses in the 1-4 series).
It is recommended that students who do not use a European language toward the major take one of the remaining required lower division courses in the 53 series, preferably the 53 course that relates to the region of the language the student is using to satisfy the upper division language requirement in the major 8
Foreign language: sufficient preparation to ensure satisfactory performance at the upper division level 0-30

Depth Subject Matter 40

Five upper division Comparative Literature courses including at least one course in a major period (such as 164A-164B-164C-164D), movement (such as 168A-168B, 169) or genre (such as 160A-160B, 161A-161B, 163, 166A-166B) and including the following required courses:
Comparative Literature 141 (recommended for the junior year);
Comparative Literature 195 (to be taken in the spring quarter before graduation).....20
Three upper division literature courses in a language other than English.....12
Two additional upper division literature courses in Comparative Literature or in any other program including English or literature in translation 8

Total Units for the Major 56-86

Major Adviser. Archana Venkatesan

Minor Program Requirements:

The minor in Comparative Literature allows students to combine courses in Comparative Literature with courses in a national literature, including English or foreign literature in translation. There is no foreign language requirement for the minor.

UNITS

Comparative Literature 24

Comparative Literature 1, 2, 3, or 4 4

At least five upper division literature courses, at least four of which are in Comparative Literature (Comparative Literature 141 and 195 recommended) 20
Courses should be chosen in consultation with, and with the approval of, the adviser.

Minor Adviser. Same as Major Adviser.

Advising. All Comparative Literature majors and minors must consult with their adviser, individually, at least once at the beginning and once at the end of each academic year.

Honors Program. Students who meet the grade point requirement for graduation with honors, and who complete the Honors Program of the College of Letters and Science, may be recommended by their departments for graduation with high honors or highest honors on the basis of an evaluation of their academic achievements in the major and in the honors project in particular. Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade point average of 3.500 in courses counted toward the major.

Other prerequisites for entrance into the program are defined by the major.

Candidates for high or highest honors in Comparative Literature must write a senior thesis under the direction of a faculty member approved by the Chairperson of the Department. For this purpose, in addition to fulfilling all other major requirements, honors candidates must enroll in 6 units of Comparative Literature 194H during the first two quarters of the senior year.

Teaching Credential Subject Representative. The Staff; see the Teaching Credential/M.A. Program on page 114.

Education Abroad Options. The department of Comparative Literature encourages students to study abroad, in the Summer Abroad program, the Quarter Abroad Program, or the Education Abroad Program.

Graduate Study. Comparative Literature offers a Graduate Program that enables students to study several literatures in their original languages in a theoretically and historically informed context and from an interdisciplinary and multicultural perspective. Ph.D. students study three literatures in the original languages and have the option of being examined on a special topic of their own devising instead of on their third literature. Detailed information may be obtained from the graduate adviser or the Chairperson of the Department.

Comparative Literature Graduate Adviser; see *http://complit.ucdavis.edu*.

Courses in Comparative Literature (COM)

Note. Many courses in Comparative Literature require that students have met the Entry Level Writing Requirement (ELWR) for the University of California.

Lower Division Courses

1. Major Books of Western Culture: The Ancient World (4)
Lecture/discussion—4 hours. Prerequisite: completion of Entry Level Writing Requirement. Introduction, through class discussion and frequent written assignments, to some of the major books of western civilization such as The Odyssey, Aeneid, Bible, and Augustine's Confessions. GE credit: ArtHum, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).—I, II, III. (I, II, III.)

2. Major Books of Western Culture: From the Middle Ages to the Enlightenment (4)
Lecture/discussion—4 hours. Prerequisite: completion of Entry Level Writing Requirement. Introduction to the methods of inquiry applied to critical reading and the practice of writing. Focus on texts from the European Middle Ages to the eighteenth century; critical analysis of the historical-cultural developments in this period. GE credit: ArtHum, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).—I, II, III. (I, II, III.)

3. Major Books of Western Culture: The Modern Crisis (4)
Lecture/discussion—4 hours. Prerequisite: completion of Entry Level Writing Requirement. Introduction, through class discussion and frequent written assignments, to the major literature and thought of the late eighteenth to the mid-twentieth century. GE credit: ArtHum, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).—I, II, III. (I, II, III.)

4. Major Books of the Contemporary World (4)
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. Comparative study of selected major Western and non-Western texts composed in the period from 1945 to the present. Intensive focus on writing about these texts, with frequent papers written about these works. GE credit: ArtHum, Div, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).—I, II, III. (I, II, III.)

5. Fairy Tales, Fables, and Parables (4)
Lecture—3 hours; discussion—1 hour. An introduction to fairy tales, fables, and parables as recurrent forms in literature, with such readings as tales from Aesop and Grimm, Chaucer and Shakespeare, Kafka and Borges, Buddhist and Taoist parables, the Arabian Nights, and African American folklore. GE credit: ArtHum, Div, Wrt.—I, II, III. (I, II, III.) Schildgen, Sharlet

6. Myths and Legends (4)
Lecture—3 hours; discussion—1 hour. Introduction to the comparative study of myths and legends, excluding those of Greece and Rome, with readings from Near Eastern, Teutonic, Celtic, Indian, Japanese, Chinese, African and Central American literary sources. GE credit: ArtHum, Div, Wrt.—I, II. (I, II.) Schein, McLean, Venkatesan

7. Literature of Fantasy and the Supernatural (4)
Lecture—3 hours; discussion—1 hour. The role of fantasy and the supernatural in literature: tales of magic, hallucination, ghosts, and metamorphosis, including diverse authors such as Shakespeare, P'u Sung-Ling, Kafka, Kawabata, Fuentes, and Morrison. GE credit: ArtHum, Div, Wrt.—II, III. (II, III.)

8. Utopias and their Transformations (4)
Lecture/discussion—3 hours; term paper. Prerequisite: satisfaction of the Subject A requirement. A consideration, in literary works from different ages, of visionary and rational perceptions of a lost paradise, Golden Age, or Atlantis—and of the inhuman nightmares that can result from perversions of the utopian dream of perfection. GE credit: ArtHum, Wrt.—(I.)

9. The Short Story and Novella (4)
Lecture/discussion—3 hours; term paper. An introduction to shorter forms of prose fiction by major authors of different countries, with special emphasis on the modern period. GE credit: ArtHum, Div, Wrt.—(III.)

10A-N. Master Authors in World Literature (2)
Lecture/discussion—1 two-hour session. Designed primarily to acquaint the non-literature major with a cross-section of writings by the world's most important authors; readings in English translation. Content alternates among the following segments: (A) Gilgamesh, Ramayana, Beowulf, Nibelungenlied; (B) Metamorphoses, Decameron, Arabian Nights, Canterbury Tales; (C) Chanson de Roland, El Cid, Igor's Campaign, Morte D'Arthur; (D) Sakuntala, Tristan and Isolde, Aucassin and Nicolette, Gawain and the Green Knight; (E) Swift, Rabelais, La Celestina, Simplicissimus; (F) Cervantes, Saikaku, Fielding, Voltaire; (G) Machiavelli, Shakespeare, Lope de Vega/Calderón, Molière/Racine, Lessing/Schiller; (H) Goethe, Byron, Stendhal, Pushkin, Lermontov; (I) Hoffmann, Gogol, Poe, Hawthorne, Maupassant, Chekhov, Melville; (J) Flaubert, Twain, Turgenev, Galdós, Ibsen; (K) Balzac, Dostoevski/Tolstoi, Hardy, Shaw, Strindberg; (L) Unamuno, Svevo, Conrad, Gide, Kafka, Faulkner; (M) Rilke/Yeats, Joyce/Woolf, Mann/Céline, Bulgakov/Tanizaki, O'Neill/Brecht, Lorca/Pirandello; (N) Camus/Sartre, García Márquez/Grass, Borges/Sarraute, Bellow/Nabokov, Beckett/Pinter, Genet/Dürrenmatt. May be repeated for credit in different subject area. Limited enrollment. (P/NP grading only.)—I, II, III. (I, II, III.)

12. Introduction to Women Writers (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: completion of subject A requirement. Survey of fiction, drama, and poetry by women writers from all continents. Concerns of women compared in light of their varied social and cultural traditions. Literary analysis of voice, imagery, narrative strategies and diction. GE credit: ArtHum, Div, Wrt.—III. Lokke

13. Dramatic Literature (3)
Lecture—3 hours. Prerequisite: completion of Subject A requirement or the equivalent. Introduction, through careful reading of selected plays, to some of the major forms of Western drama, from the earliest tragedies of ancient Greece to the contemporary American theater. Offered in alternate years. GE credit: ArtHum, Wrt.—II. Finney

14. Introduction to Poetry (3)
Lecture/discussion—3 hours. Prerequisite: completion of Subject A requirement. Comparative study of poetry in a variety of lyric and other poetic forms from different historical periods and different linguistic, national, and cultural traditions. Offered in alternate years. GE credit: ArtHum, Wrt.—(I.)

20. Humans and the Natural World (4)
Lecture/discussion—3 hours; term paper. Changing relationship between humans and the natural environment in ancient and modern authors as Virgil, Li Po, Basho, Darwin, and Thoreau. GE credit: ArtHum, Wrt.—II. (II.) McLean

25. Ethnic Minority Writers in World Literature (4)
Lecture—3 hours; term paper. Consideration of a broad range of writers who speak from an ethnic perspective different from the nominally or politically dominant culture of their respective countries and who explore the challenges faced by characters significantly affected by their ethnic minority status. GE credit: ArtHum, Div, Wrt.—(I.) Radwan

53A. Literature of China and Japan (3)
Lecture—2 hours; discussion—1 hour. Introduction to representative masterpieces of East Asia with readings from such works as The Story of the Stone, The Peach Blossom Fan, T'ang and Sung poetry, classical Japanese poetry, drama, and travel diaries, and The Tale of Genji. GE credit: ArtHum, Div, Wrt.

53B. Literature of India and Southeast Asia (3)
Lecture—2 hours; discussion—1 hour. Introduction to representative masterpieces of South Asia with readings from such works as the Mahabharata and Ramayana, The Cloud Messenger, Shakuntala, The Little Clay Cart, and the stories and poems of both ancient and modern India and Southeast Asia. GE credit: ArtHum, Div, Wrt.—(III.) Venkatesan

53C. Literatures of the Islamic World (3)
Lecture—2 hours; discussion—1 hour. Introduction to classical Islamic culture through translations of literature primarily from Arabic and Persian, as well as other languages. Topics include the concept of the self, society and power, spirituality, the natural world, the cosmos, and the supernatural. GE credit: ArtHum, Div, Wrt.—I. Sharlet

90X. Lower Division Seminar (1-2)
Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting.

98. Directed Group Study (1-5) I, II, III. The Staff (Director in charge)
Restricted to lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

100. World Cinema (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: upper-division standing, or consent of instructor. A comparative, cross-cultural study of a topic, theme, or movement in world cinema beyond the boundary of a single national tradition. Topics may include "postsocialist cinemas in East Europe and Asia," "cinema and globalization," and "popular Asian cinemas." May be repeated three times for credit when topic differs. GE Credit: ArtHum, Div, Wrt.—I, III. (I, III.) Lu

110. Hong Kong Cinema (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: upper-division standing, or consent of instructor. Hong Kong cinema, its history, industry, styles, genres, directors, and stars. Special attention to its polyglot, multicultural, transnational, colonial, and postcolonial environment. GE Credit: ArtHum, Div, Wrt.—II. (II.) Lu

120. Writing Nature: 1750 to the Present (4)
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of representations, descriptions, and discussions of humankind's problematical relationship with the non-human world in texts written in a variety of European and American traditions between 1750 and the present. Offered in alternate years. GE credit: ArtHum, Wrt.—(III.) McLean

135. Women Writers (4)
Lecture/discussion—3 hours; term paper. An exploration of women's differing views of self and society as revealed in major works by female authors of various times and cultures. Readings, principally of fiction, will include such writers as Lady Murasaki, Mme de Lafayette, and Charlotte Bronte. GE credit: ArtHum, Div, Wrt.—I, III. (I, II.) Lokke, Schiesari

138. Gender and Interpretation in the Renaissance (4)
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement, at least one course in literature, or consent of instructor. Critical analysis of Renaissance texts with primary focus on issues such as human dignity, education and gender politics; "high" and "low" culture and its relation to literary practices. (Same course as Italian 141.) GE credit: ArtHum, Div, Wrt.—II. (II.) Schiesari

139. Shakespeare and the Classical World (4)
Lecture/discussion—3 hours; term paper. Prerequisite: at least one course in literature. Shakespeare's representations of the classical world in the light of selected ancient texts and Renaissance conceptions of Antiquity, with special attention to the depiction of politics and history. Offered in alternate years.—(II.) Schein

140. Thematic and Structural Study of Literature (4)
Lecture/discussion—3 hours; term paper. Interpretation of selected works illustrating the historical evolution of themes, as well as of formal and structural elements. May be repeated for credit when substance of course varies. GE credit: ArtHum, Wrt.—(II.)

141. Introduction to Comparative Critical Theory (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one upper division literature course or consent of instructor. Introduction to comparative critical theory and its use for interpreting literary texts, film, and media forms in global culture. (Same course as Critical Theory 101.) GE credit: ArtHum, Wrt.—III. (III.) Larsen

142. Critical Reading and Analysis (4)
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Close reading of selected texts; scrutiny of very limited amount of material, with attention to the problems of texts in translation.

144. The Grotesque (4)
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of the "grotesque" in selected texts from the Renaissance to the 20th century, with attention to the "grotesque" as a means of social, cultural, and political commentary, as well as of aesthetic innovation. Offered in alternate years. GE credit: ArtHum, Wrt.—(I.)

145. Representations of the City (4)
Lecture—2 hours; discussion—1 hour; writing. Exploration of the representation of the city in major translated literary texts from a variety of literary traditions and periods. Emphasis on the diversity of urban experience in literature. Topics include public and private space, memory, and gender. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—I. Radwan, Sharlet

146. Myth in Literature (4)
Lecture—3 hours; term paper. Prerequisite: course 6 recommended. Comparative study of different versions of one or more central myths, with attention to their cultural settings, artistic and literary forms of representation, as well as to their psychological dimensions. GE credit: ArtHum, Wrt.—(II.)

147. Modern Jewish Writers (4)
Lecture/discussion—3 hours; term paper. Prerequisite: completion of the Subject A requirement and one lower division literature course. Problems of the modern Jewish experience from the perspective of the writer's construction of the self in relation to the future and to the non-Jew. Draws upon Russian, German, Yiddish, and American traditions. GE credit: ArtHum, Div, Wrt.—II. (III.)

148. Mystical Literatures of South Asia and the Middle East (4)
Lecture/discussion—3 hours; term paper. Exploration of the comparative mystical literatures of major religious traditions, with a focus on those produced in South Asia and the Middle East, although including other traditions. Offered in alternate years. GE Credit: ArtHum, Div, Wrt.—I. Venkatesan

151. Colonial and Postcolonial Experience in Literature (4)
Lecture—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. A literary introduction to the cultural issues of colonialism and postcolonialism through reading, discussing and writing on narratives which articulate diverse points of view. GE credit: ArtHum, Div, Wrt.—II. (III.) Larsen, Radwan

152. Literature of the Americas (4)
Lecture/discussion-3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of the various stylistic, historical, social and cultural factors that contribute to a hemispheric vision of American literature, encompassing works by Canadian, United States, Caribbean, Brazilian, and Spanish-American writers. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—I. (I.) Larsen

152S. Literature of the Americas (Taught in Mexico) (4)
Lecture/discussion—6 hours; term paper; fieldwork—6 hours. Prerequisite: Subject A; at least one course in literature, or consent of instructor. Various stylistic, historical, social, and cultural factors that contribute to a hemispheric vision of American literature, encompassing works by Canadian, United States, Caribbean, Brazilian, and Spanish-American writers. May be repeated one time for credit as course 152. GE credit: ArtHum, Div, Wrt.—I. (I.)

153. The Forms of Asian Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Introduction to distinctive Asian literary forms, such as haiku, noh, the Chinese novel and tale, through reading of major works. Comparison with Western genres and study of native and Western critical traditions. GE credit: ArtHum, Div, Wrt.—Lu

154. African Literature (4)
Lecture—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Pre- and post-colonial sub-Saharan African literature and the African oral traditions from which it emerged. Genres and themes of African literature in the 19th and 20th centuries. GE credit: ArtHum, Div, Wrt.—III. (I.) Adejunmobi

155. Classical Literatures of the Islamic World 600-1800 (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Subject A or consent of instructor. Major classical texts of the Islamic world with attention to intermingling of diverse cultural influences and historical context. Includes epic, romance, lyric, mystical narrative, fairy tales, essays. Texts from Arabic, Persian, Ottoman Turkish, and Urdu literature. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(II.) Sharlet

156. The Ramayana (4)
Lecture—3 hours; term paper. Exploration of the Indian epic, Ramayana, through the lens of literature, performance, and visual art. Emphasis on the text's diversity and its contemporary global relevance. Topics include Ramayanas in Southeast Asia, and in various South Asian diaspora communities. Offered in alternate years. GE Credit: ArtHum, Div, Wrt.—(II.) Venkatesan

157. War and Peace in Literature (4)
Lecture/discussion—3 hours; term papers. Prerequisite: course 1, 2, or 3, or consent of instructor. Through study of a few major works from Western and non-Western literature the course seeks to illuminate the way in which literature from antiquity to the present has dealt with the antinomy peace/war through the ages. GE credit: ArtHum, Wrt.—Radwan

158. The Detective Story as Literature (4)
Lecture—3 hours; term paper. Study of the origins, literary and social background, development and implications of the literature of detection in a comparative context. GE credit: ArtHum, Wrt.—I. Cannon

159. Women in Literature (4)
Lecture—3 hours; term paper. Prerequisite: course 1, 2, 3, or 4 or the equivalent recommended. Portrayals of women in literature, comparing selected heroines who represent a particular theme, period, or genre. Texts range around the globe and from ancient to modern works, such as Lysistrata, Emma, Hedda Gabler, The Makioka Sisters, and Top Girls. GE credit: ArtHum, Div, Wrt.

160A. The Modern Novel (4)
Lecture/discussion—3 hours; term paper. The changing image of man and his world as seen in novels by such writers as Joyce, Proust, and Mann. GE credit: ArtHum, Wrt.—III. (III.)

160B. The Modern Drama (4)
Lecture/discussion—3 hours; term paper. Readings in representative authors such as Ibsen, Strindberg, Chekhov, Pirandello and Brecht. GE credit: ArtHum, Wrt.—I. (II.) Finney

161A. Tragedy (4)
Lecture/discussion—3 hours; term paper. Persistent and changing aspects of the tragic vision in literature from ancient times to the present. GE credit: ArtHum, Wrt.

161B. Comedy (4)
Lecture/discussion—3 hours; term paper. Comic attitudes towards life in literary works of different ages. GE credit: ArtHum, Wrt.

163. Biography and Autobiography (4)
Lecture/discussion—3 hours; term paper. Portrayals of a human life in biographies and/or autobiographies of different countries and ages. Offered in alternate years. GE credit: ArtHum, Wrt.—II. (I.)

164A. The European Middle Ages (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Subject A. Medieval literary genres as the foundation for modern literary forms. Topics and themes

as love, God, vision, nature, history and politics, and sign theory. GE credit: ArtHum, Wrt.—I. (I.) Schildgen

164B. The Renaissance (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Subject A. Literature, new science, gender, politics, and exploration in European Renaissance. Readings in Petrarch, Machiavelli, Montaigne, Tasso, Ariosto, Stampa, Shakespeare, Labé and Aphra Behn. GE credit: ArtHum, Wrt.—II. (II.) Schiesari

164C. Baroque and Neoclassicism (4)
Lecture/discussion—3 hours; term paper. Readings in major authors such as Calderón, Corneille, Pascal, Racine, Milton, and Grimmelshausen, with consideration of the tension between the expansive energies of the "baroque" and the restraints of dogma and reason. GE credit: ArtHum, Wrt.

164D. The Enlightenment (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Subject A. Enlightenment writers such as Swift, Voltaire, Sterne, Rousseau, Wollstonecraft, and Kant. Emphasis on the revolutionary impact of eighteenth-century philosophical ideas and literary forms on modern political, social, and aesthetic culture. Offered in alternate years. GE credit: ArtHum, Wrt.

165. Caribbean Literatures (4)
Lecture/discussion—4 hours. Prerequisite: upper division standing. Comparative approach to the multi-lingual, multi-cultural literatures of the Caribbean. Works from English, French, and Spanish speaking regions with special attention to problems of identity, diaspora and resistance, class, gender, race. Not open for credit to students who have completed course 165S. GE credit: ArtHum, Div, Wrt.—II. (II.)

165S. Caribbean Literatures (4)
Lecture/discussion—4 hours. Prerequisite: upper division standing. Comparative approach to the multi-lingual, multi-cultural literatures of the Caribbean. Works from English, French, and Spanish speaking regions with special attention to problems of identity, diaspora and resistance, class, gender, race. Taught at the University of Havana, Cuba. Not open for credit to students who have completed course 165. GE credit: ArtHum, Div, Wrt.—II. (II.)

166. Literatures of the Modern Middle East (4)
Lecture/discussion—3 hours; term paper. Major translated works in modern Middle Eastern and North African Literature, including Arabic, Hebrew, Persian, and Turkish. Social and historical formation, with topics such as conflict and coexistence, journeys, and displaced people, gender and family. GE credit: ArtHum, Wrt.—I. (I.) Radwan, Sharlet

166A. The Epic (4)
Lecture/discussion—3 hours; term paper. Study of various forms of epic poetry in both the oral and literary traditions. May be repeated for credit in different subject area. GE credit: ArtHum, Wrt.—(I.) Schein

166B. The Novel (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Subject A. The novel as global genre: picaresque, epistolary, Bildungsroman, historical novel, contemporary forms. May be repeated one time for credit. GE credit: ArtHum, Wrt.—II. (II.)

167. Comparative Study of Major Authors (4)
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Pivotal works of artists in the Western mainstream, such as Dante, Shakespeare, Cervantes, Goethe, Tolstoi, Proust, and Joyce. GE credit: ArtHum, Wrt.

168A. Romanticism (4)
Discussion—3 hours; term paper. Prerequisite: any introductory course in literature. Introduction to the Romantic movement with emphasis upon Romantic concepts of the self, irony, love, the imagination and artistic creativity, and the relationship of the individual to nature and society. GE credit: ArtHum, Wrt.—I. McLean, Lokke

168B. Realism and Naturalism (4)
Discussion—3 hours; term paper. Prerequisite: consent of instructor. Novels and plays by Dickens, Zola, Flaubert, Dreiser, Ibsen, and Strindberg investigate marriage and adultery, the city and its perils, the hardships of industrialization, the war between the sexes, the New Woman, and other 19th-century themes. Offered in alternate years. GE credit: ArtHum, Wrt.—II. Finney

169. The Avant-Garde (4)
Lecture/discussion—3 hours; term paper. Studies in movements such as surrealism, expressionism and the absurd. GE credit: ArtHum, Wrt.

170. The Contemporary Novel (4)
Lecture—3 hours; term paper. Study of important novels from different parts of the world, including Asia, Africa, Latin America, Europe, and the United States, in the period from the Second World War to the present. GE credit: ArtHum, Wrt.

180. Selected Topics in Comparative Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement and at least one course in literature. Study of a selected topic or topics appropriate to student and faculty interests and areas of specialization of the instructor. May be repeated one time for credit when the topic differs. GE credit: ArtHum, Wrt.

180S. Selected Topics in Comparative Literature (Taught Abroad) (4)
Lecture/discussion—6 hours; extensive writing; fieldwork—6 hours. Prerequisite: Subject A; at least one course in literature, or consent of instructor. Study of selected topics appropriate to student and faculty interests and areas of specialization of the instructor. May be repeated one time for credit when topic differs. GE credit: ArtHum, Wrt.—IV. (IV.)

194H. Special Study for Honors Students (1-5)
Independent study—1-5 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a comparative topic. May be repeated for credit. (P/NP grading only.)

195. Seminar in Comparative Literature (4)
Seminar—3 hours; term paper. Prerequisite: junior standing and major in Comparative Literature, or consent of instructor. Advanced comparative study of selected topics and texts, with explicit emphasis on the theoretical and interpretive approaches that define Comparative Literature as a discipline and distinguish it from other literary disciplines. May be repeated one time for credit when topic differs. Offered in alternate years.—(III.)

197T. Tutoring in Comparative Literature (1-5)
Discussion—2-4 hours. Prerequisite: upper division standing with declared major in Comparative Literature. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with current courses offered by Comparative Literature. May be repeated for credit for a total of 6 units. (P/NP grading only.)

198. Directed Group Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

210. Topics and Themes in Comparative Literature (4)
Discussion—3 hours; term paper. Prerequisite: graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Comparative, interpretive study of the treatment of specific topics and themes in literary works from various periods, societies, and cultures, in light of these works' historical and sociocultural contexts. May be repeated for credit when topic differs.—III. (II.)

214. Approaches to Lyric Poetry (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Analysis and interpretation of poetic texts in different historical periods and national literatures, with consideration of major theoretical developments in the understanding of poetic discourse. Offered in alternate years.—(III.) Schiesari

215. Forms of the Spiritual Quest (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor; knowledge of at least one foreign language. An exploration, culminating in a research paper, of changing forms of the quest for transcendence in different cultures, mainly in major works of Western literature, but also in other traditions and from the perspectives of other disciplines.

220. Literary Genres (4)
Discussion—3 hours; term paper. Prerequisite: graduate standing in Comparative Literature, English, or a foreign-language literature, or consent of instructor. Comparative literature of major works in a particular genre from various linguistic, national, and cultural traditions, with particular attention to historical developments within the genre and to genre theory. May be repeated for credit when topic differs.—I. Schein

238. Gender and Interpretation (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of how literary texts from different periods, societies, and cultures represent gender roles and gender hierarchy, building on recent work on gender in anthropology, literature, psychology, and women's studies.

250A. Research in Comparative Literature (4)
Individual instruction—1 hour. Individually guided research, under the supervision of a faculty member, in a comparative topic culminating in a term paper. Required of M.A. and Ph.D. candidates.—I, II, III. (I, II, III.)

250B. Research in Comparative Study of Author, Period, or Genre (4)
Individual instruction—1 hour. Individually guided research, under the supervision of a faculty member, in the specialized study of an individual author, historical period, or literary genre culminating in a term paper. Required of Ph.D. candidates.—I, II, III. (I, II, III.)

250C. Basic Research for the Dissertation (4)
Individual instruction—1 hour. Individually guided research, under the supervision of a faculty member, in preparation for the dissertation in Comparative Literature. Required of Ph.D. candidates.—I, II, III. (I, II, III.)

250D. Dissertation Prospectus (4)
Independent study. Individually guided writing of the dissertation prospectus under supervision of a faculty member. Must be taken prior to completion of the qualifying exam. Required of Ph.D. candidates. (S/U grading only.)—I, II, III. (I, II, III)

255. Colloquium (2)
Lecture/discussion—2 hours. Prerequisite: graduate standing. Oral presentation and critique of research papers; discussion of current problems in teaching and research in Comparative Literature. May be repeated for credit. (S/U grading only.)—(II.)

260. Contexts of the 19th-Century Novel (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Development in 19th-century history, culture, and society in relation to major trends in the 19th-century novel. Offered in alternate years.—(III.)

298. Directed Group Study (1-5)
Prerequisite: graduate standing. (S/U grading only.)

299. Individual Study (1-12)
(S/U grading only.)

299D. Special Study for the Doctoral Dissertation (1-12)
(S/U grading only.)

Professional Courses

390. Teaching Comparative Literature in College (3)
Lecture—1 hour; discussion—2 hours. Methods of teaching Comparative Literature with specific application to the introductory courses 1, 2, and 3, in relation to major cultural and social developments. Discussion also of ways to teach analytical writing. (S/U grading only.)—I. (I.)

392. Teaching Internship in Comparative Literature (1)
Discussion—1 hour. Regular consultations between the student instructor teaching Comparative Literature courses and a supervisor. In-class evaluation of teaching. May be repeated for credit after consultation with supervisor. (S/U grading only.)—I, II, III. (I, II, III.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Comparative Literature (A Graduate Group)

Juliana Schiesari, Ph.D., Chairperson of the Group

Group Office. 611 Sproul Hall
(530) 752-5799

Faculty

Moradewun Adejunmobi, Ph.D., Professor *(African Studies)*
Marc Blanchard, Ph.D, Professor *(Comparative Literature, French) Academic Senate Distinguished Teaching Award*
JoAnn Cannon, Ph.D., Professor *(Italian)*
Xiaomei Chen, Ph.D., Professor *(East Asian Languages and Cultures)*
Margaret Ferguson, Ph.D., Professor *(English)*
Gail Finney, Ph.D., Professor *(Comparative Literature, German) Distinguished Teaching Award-Graduate/Professional*
Inéz Hernández Avila, Professor *(Native American Studies)*
Neil Larsen, Ph.D., Professor *(Comparative Literature, Critical Theory)*
Kari Lokke, Ph.D., Professor *(Comparative Literature)*
Sheldon Lu, Ph.D., Professor *(Comparative Literature)*
Seth Schein, Ph.D., Professor *(Comparative Literature)*
Juliana Schiesari, Ph.D., Professor *(Italian, Comparative Literature)*
Brenda Schildgen, Ph.D., Professor *(Comparative Literature)*
Jocelyn Sharlet, Ph.D., Assistant Professor *(Comparative Literature)*
Olga Stuchebrukhov, Ph.D., Associate Professor *(Comparative Literature, Russian)*
Archana Venkatesan, Ph.D., Assistant Professor *(Comparative Literature)*
Michelle Yeh, Ph.D., Professor *(East Asian Languages and Cultures)*

Graduate Study. The Comparative Literature Program offers the Ph.D. degree with a strong emphasis on individual research under the supervision of a faculty member. Candidates for the Ph.D., in addition to research of a comparative nature, study three literatures (one of which may be English and/or American) in the original languages, acquiring an extensive knowledge of the overall development of one. Students may choose to focus on a special topic instead of on a third literary tradition.

Within this framework, each student's program will be tailored to individual interests, and may center on a major historical period, such as the Renaissance or the modern age; a genre, such as lyric poetry, epic, drama, or the novel; or any other special emphasis approved by the Graduate Adviser.

Preparation. For admission to the Ph.D. Program candidates should have an undergraduate major in literature and reading ability in three foreign languages. The Group requires three letters of recommendation and a sample of recent written work, and it is recommended that students submit their GRE scores.

Graduate Adviser. J. Schiesari *(Italian, Comparative Literature)*

Comparative Pathology (A Graduate Group)

Reen Wu, Ph.D., Chairperson of the Group

Group Office. 5215, Vet Med 3A
(530) 752-2657;
http://www.vetmed.ucdavis.edu/pmi/comppath/homecp.htm

Faculty

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Barry A. Ball, D.V.M., Ph.D., Professor *(Population Health and Reproduction)*
Danika Bannasch, D.V.M., Ph.D., Associate Professor *(Population Health and Reproduction)*
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Robert J. Brosnan, D.V.M., Ph.D., Assistant Professor *(Surgical and Radiological Sciences)*
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Peter Dickinson, D.V.M., Ph.D., Assoc. Professor *(Neurology/Neurosurgery)*
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M. Eric Gershwin, M.D., Professor *(Rheumatology)*
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Patricia Pesavento, D.V.M., Ph.D., Assistant Professor *(Pathology, Microbiology & Immunology)*
Kent E. Pinkerton, Ph.D., Professor *(Anatomy, Physiology and Cell Biology) Distinguished Teaching Award-Graduate/Professional*
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Charles G. Plopper, Ph.D., Professor *(Anatomy, Physiology and Cell Biology)*
Rachel E. Pollard, D.V.M., Ph.D., Assistant Professor *(Surgical and Radiological Sciences)*
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Ebenezer Yamoah, M.Sc., Ph.D., Professor *(Center for Neuroscience)*
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Mark Zern, Ph.D,. Professor *(UCDHS: Gastroenterology & Hepatology)*
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Mary Chang, MS, Ph.D. Assistant Researcher *(Internal Medicine)*
Marta L. Marthas, Ph.D., Adjunct Professor *(Pathology, Microbiology, and Immunology)*
Michael B. McChesney, Ph.D., Associate Adjunct Professor *(Pathology and Oncology)*
Lisa Miller, Ph.D., Assistant Research Cell Biologist *(Anatomy, Physiology and Cell Biology)*
Woutrina A. Miller, D.V.M., M.P.V.M., Ph.D., Assistant Adjunct Professor *(Pathology, Microbiology and Immunology)*
William K. Reisen, Ph.D., Adjunct Professor and Research Entomologist *(Pathology, Microbiology and Immunology*
Ellen E. Sparger, D.V.M., Ph.D., Associate Adjunct Professor *(Medicine and Epidemiology)*
Coleen Sweeney, Ph.D., Assistant Adjunct Professor *(Biochemistry and Molecular Medicine)*
Laura Van Winkle, Associate Adjunct Professor *(Anatomy, Physiology and Cell Biology)*
Joseph G. Zinkl, D.V.M., Ph.D., Professor Emeritus *(Pathology, Microbiology and Immunology)*

Graduate Study. The Graduate Group in Comparative Pathology offers the M.S. and Ph.D. degrees for graduate study in disciplines concerned with disease processes. The group's focus is the study of the causes and nature of disease processes in animals and humans, with major emphasis on the mechanisms responsible for the development of diseases at the level of organ systems, the cell, or subcellular mechanisms. The group brings a wide array of scientific knowledge to this study, so that students with divergent interests can be accommodated in programs designed for individual needs. Beyond core courses selected from disciplines such as anatomy, bacteriology, genetics, immunology, parasitology, pathology, physiology, and virology, course programs are intentionally flexible.

Preparation. This program is primarily for students who have a professional medical degree, e.g., D.V.M., M.D., D.D.S. Students without a professional degree will be considered if they have an especially strong background in basic biomedical sciences.

Graduate Adviser. F.C. Mohr *(Pathology, Microbiology, and Immunology)*

Computer Science

See Computer Science, on page 206; Computer Science (A Graduate Group), on page 207; Engineering: Computer Science, on page 260; and Engineering: Electrical and Computer Engineering, on page 265.

Computer Science

(College of Letters and Science)

Prasant Mohapatra, Ph.D., Chairperson of the Department

Department Office. 2063 Kemper Hall (530) 752-7004; *http://www.cs.ucdavis.edu*

Faculty. For complete faculty listing, please see Engineering: Computer Science, on page 260.

The Major Program

The computer science major prepares students for careers involving the design of computer systems and their application to science, industry, and management.

The Program. Students taking this major receive solid grounding in fundamentals of computer languages, operating systems, computer architecture, and the mathematical abstraction required to use the computer in solving complex tasks. For students interested in the engineering aspects of computer science, see Engineering: Computer Science, on page 260.

Career Alternatives. The computer science program prepares students for advanced work in computer science or in other disciplines requiring advanced knowledge of the use of computers.

B.S. Major Requirements:

	UNITS
Preparatory Subject Matter	**52-58**
Mathematics 21A-21B-21C; 22A or 67	15-16
Statistics 32	3
Computer Science Engineering 20, 30, 40, 60	16
Computer Science Engineering 50 or Electrical and Computer Engineering 70	4
One series from the following four	14-19
(a) Chemistry 2A-2B-2C	
(b) Chemistry 2A-2B and Biological Sciences 2A	
(c) Chemistry 2AH-2BH-2CH	
(d) Physics 9A-9B-9C and Mathematics 21D	
Depth Subject Matter	**46-50**
Computer Science Engineering 120 or 122B (completion of only 120 or 122B will satisfy the core requirement, but not a computer science elective simultaneously); 122A, 140A; 150, 154A	20
Computer Science/Mathematics electives	26-30
Minimum of 7 courses including at least one mathematics or statistics course from: Computer Science Engineering 120, 122B (completion of only 120 or 122B will satisfy the core requirement, but not a computer science elective simultaneously), 124, 129, 130, 140B, 142, 145, 152A, 152B, 152C, 153, 154B, 156, 158, 160, 163, 165A, 165B, 170, 175, 177, 178, 188, 189, (minimum of 3 units) from approved 192 or 199, Electrical and Computer Engineering 180A, 180B, Statistics 131A, Mathematics 25, 108, 115A, 115B, 135A, 141, 145, 147, 148, 150A, 150B, 150C, 160.	
Total Units for the Major	**98-108**

Major Advisers. N. Matloff, M. Farrens, M. Franklin, N. Amenta, R. Olsson, P. Rogaway, D. Ghosal

Minor Program Requirements:

	UNITS
Computer Science	**24**
Computer Science Engineering 60	4
Upper division Computer Science Engineering courses	20
Select from Computer Science Engineering 120, 122A, 122B, 124, 129, 130, 140A, 140B, 142, 145, 150, 152A, 152B, 152C, 153, 154A, 154B, 155, 156, 157, 158, 160, 163, 165A, 165B, 166, 170, 175, 177, 178, 189A-L, maximum of 3 units from approved 192 or 199.	

Note. The minor program has prerequisites of Computer Science Engineering 20, 30, and 40, and Mathematics 16A or 21A.

Graduate Study. See Graduate Studies, on page 109.

Computer Science (A Graduate Group)

Kwan-Liu Ma, Ph.D., Chairperson of the Group

Group Office. 2063 Engineering II (Department of Computer Science)
(530) 752-7004; *gradinfocs@ucdavis.edu*; *http://www.cs.ucdavis.edu*

Faculty

Venkatesh Akella, Ph.D., Professor *(Electrical and Computer Engineering)*
Nina Amenta, Ph.D., Professor *(Computer Science)*
Zhaojun Bai, Ph.D., Professor *(Computer Science)*
Matthew Bishop, Ph.D., Associate Professor *(Computer Science)*
Hemant Bhargava, Ph.D., Professor *(Computer Science)*
T.S. Chang, Ph.D., Professor *(Electrical and Computer Engineering)*
Hao Chen, Ph.D., Assistant Professor *(Computer Science)*
Harry Cheng, Ph.D., Professor *(Mechanical and Aerospace Engineering)*
R. Holland Cheng, Ph.D., Professor *(Molecular and Cellular Biology)*
Chen-Nee Chuah, Ph.D., Assistant Professor *(Electrical and Computer Engineering)*
Jesus M. D'Souza, Ph.D., Assistant Professor *(Mechanical and Aerospace Engineering)*
Riassa D'Souza, Ph.D., Assistant Professor *(Mechanical and Aerospace Engineering)*
Jesus DeLoera, Ph.D., Professor *(Mathematics)*
Prem Devanbu, Ph.D., Associate Professor *(Computer Science)*
Matthew Farrens, Ph.D., Professor *(Computer Science)*
Vladimir Filkov, Ph.D., Assistant Professor *(Computer Science)*
Matthew Franklin, Ph.D., Professor *(Computer Science)*
Dipak Ghosal, Ph.D., Professor *(Computer Science)*
Tood J. Green, Ph.D., Assistant Professor *(Computer Science)*
Daniel Gusfield, Ph.D., Professor *(Computer Science)*
Bernd Hamann, Ph.D., Professor *(Computer Science)*
Michael Hogarth, Ph.D., Assistant Professor *(School of Medicine)*
Mont Hubbard, Ph.D., Professor *(Mechanical and Aerospace Engineering)*
Greta Hsu, Ph.D., Assistant Professor *(Graduate School of Management)*
Sanjay Joshi, Ph.D., Assistant Professor *(Mechanical and Aerospace Engineering)*
Kenneth Joy, Ph.D., Professor *(Computer Science)*
Patrice Koehl, Ph.D., Associate Professor *(Computer Science)*
Mathias Koeppe, Ph.D., Assistant Professor *(Mathematics)*
Karl Levitt, Ph.D., Professor *(Computer Science)*
Xin Liu, Ph.D., Assistant Professor *(Computer Science)*
Kwan-Liu Ma, Ph.D., Professor *(Computer Science)*
Bertram Ludaescher, Ph.D., Associate Professor *(Computer Science)*
Charles Martel, Ph.D., Professor *(Computer Science)*
Norman Matloff, Ph.D., Professor *(Computer Science)*
Nelson Max, Ph.D., Professor *(Applied Science)*
E.O. Milton, Ph.D., Professor *(Mathematics)*
Deb Niemeier, Ph.D., Professor *(Civil and Environmental Engineering)*
Prasant Mohapatra, Ph.D., Associate Professor *(Computer Science)*
Biswanath Mukherjee, Ph.D., Professor *(Computer Science) Distinguished Graduate Mentoring Award*
Ronald Olsson, Ph.D., Professor *(Computer Science)*
John Owens, Ph.D., Assistant Professor *(Electrical and Computer Engineering)*
Raju Pandey, Ph.D., Associate Professor *(Computer Science)*
Robert Redinbo, Ph.D., Professor *(Electrical and Computer Engineering)*
David Rocke, Ph.D., Professor *(Applied Science)*
Garry Rodrique, Ph.D., Professor *(Applied Science)*
Phillip Rogaway, Ph.D., Professor *(Computer Science)*
Kenneth Shackel, Ph.D., Professor *(Plant Sciences)*
David Slaughter, Ph.D., Professor *(Biological and Agricultural Engineering)*
Oliver Staadt, Ph.D., Assistant Professor *(Computer Science)*
Henning Stahlberg, Ph.D., Assistant Professor *(Molecular and Cellular Biology)*
Ilias Tagkopoulos, Ph.D., Assistant Professor *(Computer Science)*
Susan Ustin, Ph.D., Professor *(Land, Air and Water Resources)*
S. Felix Wu, Ph.D., Associate Professor *(Computer Science)*
Rao Vemuri, Ph.D., Professor *(Applied Science)*
Kent Wilken, Ph.D., Associate Professor *(Electrical and Computer Engineering)*
David Woodruff, Ph.D., Professor *(Graduate School of Management)*
Catherine Yang, Ph.D., Assistant Professor *Graduate School of Management)*
Peter Yellowlees, Ph.D., Professor *School of Medicine)*
Ben Yoo, Ph.D., Professor *(Electrical and Computer Engineering)*

Emeriti Faculty

Ralph Algazzi, Ph.D., Professor Emeritus
Meera Blattner, Ph.D., Professor Emeritus
S.L. Hakimi, Ph.D., Professor Emeritus
Peter Linz, Ph.D., Professor Emeritus
Manfred Ruschitzka, Ph.D., Professor Emeritus
Michael Soderstrand, Ph.D., Professor Emeritus
Donald Topkis, Ph.D., Professor Eremitus
Richard Walters, Ph.D., Professor Emeritus

Affiliated Faculty

Owen Carmichael, Ph.D., Visiting Assistant Professor *(Med Neurology)*

Graduate Study. The Graduate Group in Computer Science offers programs of study leading to the M.S. and Ph.D. degrees in Computer Science. The varied nature of the faculty brings a wide variety of research interests to the program. Research strengths lie in algorithms, computational biology, computer architecture, computer graphics and visualization, database systems, computer security and cryptography, computer networks, program specifications and verification, programming languages and compilers, parallel and distributed systems, scientific computation, and software engineering. Interdisciplinary research in computer science is encouraged.

Preparation. Normal preparation for the program is a bachelor's degree in either computer science or in a closely related field (such as electrical engineering or mathematics, with substantial course work in computer science). Applications are also considered from students with outstanding records in other disciplines. M.S. students may either complete a thesis or pass a comprehensive examination. Ph.D. students must pass a qualifying oral examination and complete a dissertation demonstrating original research in an area approved by the Graduate Group.

Graduate Advisers. H. Chen, P. Devanbu, M. Farrens, D. Ghosal, C. Martel, P. Rogaway

Conservation Biology

See Ecology (A Graduate Group), on page 218; Environmental Biology and Management, on page 286; and Wildlife, Fish, and Conservation Biology, on page 533.

Consumer Science

(College of Agricultural and Environmental Sciences)

Faculty. See under the Division of Textiles and Clothing, on page 506.

Major Programs. The Consumer Food Science option under the Food Science major is a related program. See also Food Science and Technology, on page 305, Nutrition, on page 440, and Textiles and Clothing, on page 506.

Graduate Study. For graduate study, see Graduate Studies, on page 109.

Courses in Consumer Science (CNS)

Questions pertaining to the following courses should be directed to the Division of Textiles and Clothing Advising office in 129 Everson Hall.

Lower Division Course

92. Internship in Consumer Science (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Internship on and off campus in a consumer science related area. (P/NP grading only.)

Upper Division Courses

100. Consumer Behavior (3)
Lecture—3 hours. Prerequisite: preparation in areas of psychology or sociology and economics recommended. Provides a set of behavioral concepts and theories useful in understanding consumer behavior on the part of the individual, business, and social organizations. Conceptual models to help guide and understand consumer research will be presented. GE credit: SocSci, Div, Wrt.

192. Internship in Consumer Science (1-12)
Internship—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Internship on and off campus in a consumer science related area. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Course

299. Research (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Contemporary Leadership

(College of Agricultural and Environmental Sciences)

The Science and Society Program offers a minor in Contemporary Leadership, open to all undergraduate students regardless of major. The minor provides a broad overview of leadership theory and practice, and engages students in critical thinking, self-reflection, problem solving and multicultural education. Students should contact the minor adviser for course selection and plan approval.

Consult advisors often to insure timely enrollment in Science and Society 192 and 190X as courses with fewer than ten students will not be taught.

Minor Program Requirements:

UNITS

Contemporary Leadership 24

Core Leadership Courses

Science and Society 130 4
Science and Society 192 (must be taken concurrently with an approved internship) 2
Science and Society 190X..... 2

Preparatory Subject Matter

Students are required to complete 4 units from each of the following four categories. All courses are 4 units unless specified in parentheses:

Ethics and Values

Animal Science 170, Computer Science 188 (3), English 107, Environmental Science and Policy 164 (3), Nature and Culture 120, Philosophy 115, 116, 117, Psychology 175 4

Communication, Interpersonal Relationships and Human Dynamics

Anthropology 139AN, Communication 134, 135, 136, Community and Regional Development 172, 174, Linguistics 163, Psychology 151, Sociology 126, 132, University Writing Program 104 (A-F) 4

Organization Structure and Cultures

American Studies 125, Anthropology 105, 123BN, Community and Regional Development 152, 154, 158, 164, Sociology 30A (3), 156, 180A, 180B, 183, Women's Studies 140..... 4

Multiculturalism, the Global Community and Social Change

American Studies 133, 153, 156, Community and Regional Development 176, English 179, History 173, 178A, 178B, Native American Studies 134, Political Science 124, 125, 130, Textiles and Clothing 174..... 4

Minor Adviser. The list of appropriate courses changes over time. Consult Science and Society (Plant Pathology) to request an advising appointment at *clm@ucdavis.edu*.

Critical Theory

Scott C. Shershow, Ph.D., Program Director

Program Office. 611 Sproul Hall
(530) 752-5799; *http://crittheory.ucdavis.edu*

Committee in Charge

Jeff Fort, Ph.D. *(French and Italian)*
Neil Larson, Ph.D. *(Comparative Literature)*
Gerhard Richter, Ph.D. *(German)*
David Simpson, Ph.D. *(English)*
Blake Stimson, Ph.D. *(Art History)*

Graduate Study. The program in Critical Theory offers study and research leading to the Ph.D. with a designated emphasis in Critical Theory. The program provides theoretical emphasis and interdisciplinary perspective to students already preparing for the Ph.D. in one of 13 participating departments (Anthropology, Comparative Literature, Culture Studies, Education, English, French, German, History, Music, Native American Studies, Sociology, Spanish, and Theatre and Dance). Students complete all requirements for the Ph.D., including the dissertation, in one of the participating departments. Minimum coursework for the Critical Theory Designated Emphasis consists of four courses. The first three of these, Critical Theory 200A, 200B, and 200C form a coherent sequence and are normally taken in consecutive order. For the fourth course, students have the option of taking another section of Critical Theory 200B or an approved course from any affiliated department.

Graduate Adviser. Consult Critical Theory Program office.

Courses in Critical Theory (CRI)

Upper Division Courses

101. Introduction to Critical Theoretical Approaches to Literature and Culture (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one upper division literature course or consent of instructor. Introduction to critical theory and its use for interpreting literary texts, film, and media forms in our present global culture. (Same course as Comparative Literature 141.) GE credit: ArtHum, Wrt.—III. (III.)

Graduate Courses

200A. Approaches to Critical Theory (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing in a participating program. The problem of interpretation in 20th-century thought with a critical overview of various theoretical approaches (e.g., semiotics, hermeneutics, deconstruction, social and cultural critique, feminist theory, psychoanalysis).—I, II, III. (I, II, III.)

200B. Problems in Critical Theory (4)
Seminar—3 hours; term paper. Focused study of a particular critical theoretical approach, school or perspective. Topics may include but are not limited to: critical approaches to the study of culture, film, historiography, visual culture, the body, and aesthetics. May be repeated for credit with consent of instructor if topic differs.—I, II, III. (I, II, III.)

200C. History of Critical Theory (4)
Seminar—3 hours; term paper. Critical analysis and discussion of pre-twentieth century theories of literary and cultural criticism. Topics may include but are not limited to: ancient and early modern philosophy; nature and culture in the Renaissance; theories of Mimesis from antiquity to the Renaissance. May be repeated for credit with consent of instructor if topic differs.—I, II, III. (I, II, III.)

201. Critical Theory Special Topics (4)
Seminar—3 hours; term paper. Prerequisite: course 200A. Application of theoretical principles to one specific research topic. May be repeated for credit with consent of instructor when topic differs.—I, II, III. (I, II, III.)

202. Visual Culture (4)
Lecture/discussion—4 hours. Prerequisite: course 200A strongly recommended. Analysis of image production in the contemporary world (photography, film, television, advertising, etc.) and their effects on individual subjectivities and collective social identities.—II. (II.)

298. Directed Group Study (1-5)

299. Individual Study (1-12)
(S/U grading only.)

Crop Science and Management

This major was discontinued as of Fall 2008; see Plant Sciences, on page 461.

(College of Agricultural and Environmental Sciences)

Cultural Studies (A Graduate Group)

Caren Kaplan, Ph.D., Director of the Group

Group Office. 3337 Hart Hall
(530) 754-7683; *http://culturalstudies.ucdavis.edu*

Committee in Charge

Carolyn de la Pena, Ph.D. (*American Studies)*
Elizabeth Freeman, Ph.D. (*English)*
Laura Grindstaff, Ph.D. (*Sociology)*
Robert Irwin, Ph.D. (*Spanish and Classics)*
Susan Kaiser, Ph.D. (*Textiles and Clothing, Women and Gender Studies)*
Caren Kaplan, Ph.D. (*Woman and Gender Studies)*
Ari Y. Kelman, Ph.D. (*American Studies)*
Parama Roy, Ph.D. (*English)*
Eric Smoodin, Ph.D. (*American Studies)*

Affiliated Faculty

Moradewun Adejunmobi, Ph.D., Professor *(African American and African Studies)*
David Biale, Ph.D., Professor *(History, Jewish Studies)*
Charlotte Biltekoff, Ph.D., Assistant Professor *(American Studies, Food Studies)*
Patrick Carroll, Ph.D., Assistant Professor *(Sociology, Science and Technology Studies)*
Angie Chabram-Dernersesian, Ph.D., Professor *(Chicana/o Studies)*
Miroslava Chavez-Garcia, Ph.D., Associate Professor *(Chicana/o Studies)*
Tim Choy, Ph.D., Assistant Professor (Anthropology, Science and Technology Studies)
Christina Cogdell, Ph.D., Associate Professor *(Design)*
Elizabeth Constable, Ph.D., Associate Professor *(French and Italian)*
Allison Coudert, Ph.D., Professor *(Religious Studies)*
Marisol de la Cadeña, Ph.D., Associate Professor *(Anthropology)*
Maxine Craig, Ph.D., Associate Professor *(Women and Gender Studies)*
Sergio de la Mora, Ph.D., Associate Professor *(Chicana/o Studies)*
Carolyn de la Peña, Ph.D., Associate Professor *(American Studies)*
Gregory Dobbins, Ph.D., Assistant Professor *(English)*
Donald Donham, Ph.D., Professor *(Anthropology)*
Joseph Dumit, Ph.D., Associate Professor *(Anthropology, Science and Technology Studies)*
Frances Dyson, Ph.D., Associate Professor *(Technocultural Studies)*
Omnia El Shakry, Ph.D., Assistant Professor *(History)*
Gail Finney, Ph.D., Professor *(Comparative Literature, German and Russian) Distinguished Teaching Award-Graduate/Professional*
Jaimey Fisher, Ph.D., Associate Professor *(German and Russian)*
Yvette Flores, Ph.D., Professor *(Chicana/o Studies)*
Kathleen Frederickson, Ph.D., Professor *(English)*
Elizabeth Freeman, Ph.D., Associate Professor *(English)*
Ryken Grattet, Ph.D., Associate Professor *(Sociology)*
Laura Grindstaff, Ph.D., Associate Professor *(Sociology)*
John R. Hall, Ph.D., Professor *(Sociology)*
Bruce Haynes, Ph.D., Associate Professor *(Sociology)*

Wendy Ho, Ph.D., Associate Professor *(Asian American Studies, Women and Gender Studies)*
Hsuan Hsu, Ph.D., Professor *(English)*
Lynette Hunter, Ph.D., Professor *(Theatre and Dance)*
Robert Irwin, Ph.D., Associate Professor *(Spanish and Classics)*
Mark Jerng, Ph.D., Assistant Professor *(English)*
Kevin Johnson, J.D., Professor *(School of Law)*
Alessa Johns, Ph.D., Associate Professor *(English)*
Suad Joseph, Ph.D., Professor *(Anthropology, Women and Gender Studies)*
Douglas Kahn, Ph.D., Professor *(Technocultural Studies)*
Susan Kaiser, Ph.D., Professor *(Textiles and Clothing, Women and Gender Studies)*
Caren Kaplan, Ph.D., Professor *(Women and Gender Studies)*
Ari Y. Kelman, Ph.D., Associate Professor *(American Studies)*
Richard Kim, Ph.D., Assistant Professor *(Asian American Studies)*
Elisabeth Krimmer, Ph.D., Associate Professor *(German and Russian)*
Catherine Kudlick, Ph.D., Professor (*History*)
Anna K. Kuhn, Ph.D., Professor *(Women and Gender Studies)*
Benjamin Lawrance, Ph.D., Assistant Professor *(History)*
Michael Lazzara, Ph.D., Assistant Professor *(Spanish and Classics)*
Sheldon Lu, Ph.D., Professor *(Comparative Literature)*
Dean MacCannell, Ph.D., Professor Emeritus *(Environmental Design)*
Sunaina Maira, Ph.D., Associate Professor *(Asian American Studies)*
Desirée Martín, Ph.D., Assistant Professor *(English)*
Jay Mechling, Ph.D., Professor Emeritus *(American Studies)*
Luz Mena, Ph.D., Assistant Professor *(Women and Gender Studies)*
Colin Milburn, Ph.D., Assistant Professor *(English)*
Susette Min, Ph.D., Assistant Professor *(Asian American Studies)*
Kimberly Nettles, Ph.D., Assistant Professor *(Women and Gender Studies)*
Judith Newton, Ph.D., Professor Emerita *(Women and Gender Studies)*
Bettina Ng'weno, Ph.D., Assistant Professor *(African American and African Studies)*
Robert Ostertag, Ph.D., Professor *(Technocultural Studies)*
Halifu Osumare, Ph.D., Associate Professor *(African American and African Studies)*
Ana Peluffo, Ph.D., Associate Professor *(Spanish and Classics)*
Vaidehi Ramanathan, Ph.D., Professor *(Linguistics)*
Gerhard Richter, Ph.D., Professor *(German and Russian)*
Michael Rios, Ph.D., Assistant Professor *(Environmental Design)*
Catherine Robson, Ph.D., Associate Professor *(English)*
Jon Rossini, Ph.D., Assistant Professor *(Theatre and Dance)*
Parama Roy, Ph.D., Associate Professor *(English)*
Margaret Rucker, Ph.D., Professor *(Textiles and Clothing)*
Suzana Sawyer, Ph.D., Associate Professor *(Anthropology)*
Juliana Schiesari, Ph.D., Professor *(Comparative Literature, French and Italian)*
Barbara Sellers-Young, Ph.D., Professor *(Theatre and Dance)*
Sudipta Sen, Ph.D., Professor *(History)*
Scott Shershow, Ph.D., Professor *(English)*
Scott Simmon, Ph.D., Professor *(English)*
Julia Simon, Ph.D., Professor *(French and Italian)*
Michael P. Smith, Ph.D., Professor *(Human and Community Development)*
Eric Smoodin, Ph. D., Professor *(American Studies)*
Smriti Srinivas, Ph.D., Associate Professor *(Anthropology)*
Blake Stimson, Ph.D., Professor *(Art History)*
Stanley Sue, Ph.D., Professor *(Psychology, Asian American Studies)*
Madhavi Sunder, J.D., Professor *(School of Law)*
Margaret Swain, Ph.D., Associate Adjunct Professor *(Women and Gender Studies)*
Julie Sze, Ph.D., Assistant Professor *(American Studies)*
Patricia Turner, Ph.D., Professor *(African American and African Studies)*
David Van Leer, Ph.D., Professor *(English)*
Clarence Walker, Ph.D., Professor *(History)*
Grace Wang, Ph.D., Assistant Professor *(American Studies)*
Heghnar Watenpaugh, Ph.D., Associate Professor *(Art History)*
Evan Watkins, Ph.D., Professor (*English)*
Karen Watson-Gegeo, Ph.D., Professor *(Education) Distinguished Graduate Mentoring Award*
Carl Whithaus, Ph.D., Associate Professor *(University Writing Program)*
Diane Wolf, Ph.D., Professor *(Sociology)*
Julie Wyman, Ph.D., Assistant Professor *(Technocultural Studies)*
Li Zhang, Ph.D., Associate Professor *(Anthropology)*
Michael Ziser, Ph.D., Assistant Professor *(English)*

Graduate Study. The Cultural Studies Graduate Program offers both M.A. and Ph.D. degrees in Cultural Studies. The program emphasizes an interdisciplinary approach to cultural inquiry that includes analyses of intersecting categories such as class, gender, race, ethnicity, sexuality, nationality, and the like. Students entering the program will use and develop methodologies from many fields to suit their objects of study. Students may pursue research in the following designated areas: *(1)* gender (including masculinity studies), *(2)* sexualities, *(3)* comparative race studies, *(4)* media and popular cultural representation, *(5)* science and society, *(6)* transnational and global studies, *(7)* religions, communities, and politics, *(8)* rhetoric and critical theory, and *(9)* disability studies. Or, with the close guidance and supervision of a faculty committee, students may create their own areas of emphasis.

Preparation. Normal preparation for the program is a bachelor's degree in a related field. M.A. students must pass an examination. Ph.D. students must pass a qualifying examination, a comprehensive examination, and complete a dissertation demonstrating original research in an area approved by the Graduate Group. In addition to the standard UC Davis graduate application (which requires a statement of purpose), we also require three letters of recommendation, transcripts, GRE scores, writing sample (ten-page minimum, not exceeding twenty pages), and a fellowship application.

Graduate Advisers. Carolyn de la Pena *(American Studies)*, Caren Kaplan *(Women and Gender Studies)*, Eric Smoodin *(American Studies)*

Courses in Cultural Studies (CST)

Graduate Courses

200A. Histories of Cultural Studies (4)
Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Undergraduate coursework in the humanities or social sciences recommended. Histories and traditions of cultural studies internationally; multiple legacies of cultural studies as a field of inquiry in various geographical contexts; foregrounds important critical perspectives resulting from social and intellectual movements worldwide.—I. (I.)

200B. Theories of Cultural Studies (4)
Lecture/discussion—4 hours. Prerequisite: course 200A or consent of instructor. Definitions of "critical" scholarship and examination of various contexts in which cultural studies theory has emerged worldwide. Both mainstream and alternative theoretical traditions, such as those developed by people of color and by other minoritized groups.—II. (II.)

200C. Practices of Cultural Studies (4)
Lecture/discussion—4 hours. Prerequisite: courses 200A and 200B or consent of instructor. Methodological and practical applications of cultural studies research. Critical analyses of ethnography, textual analysis, social change, community development, and identity formation. Emphasis given to students' unique versions of cultural studies practices.—III. (III.)

204. History and Theory of Sexualities (4)
Lecture/discussion—4 hours. Prerequisite: course 200A (may be taken concurrently) or consent of instructor. Studies of sexualities in feminist, literary, historical, and cultural studies research, specifically examining the emergence of "sexuality" as a field of research and the relationship of sexuality studies to cultural forms, subjectivity, and social relations generally. Not offered every year.—I. (I.)

206. Studies in Race Theory (4)
Lecture/discussion—4 hours. Prerequisite: course 200A (may be taken concurrently) or consent of instructor. Theoretical framework for the critical study of race, drawing on contemporary cultural studies and postcolonial scholarship in order to understand the social production of "race" as a category for organizing social groups and determining group processes. Not offered every year.—II. (II.)

208. Studies in Nationalism, Transnationalism, and Late Capitalism (4)
Lecture/discussion—4 hours. Prerequisite: course 200A (may be taken concurrently) or consent of instructor. Contemporary theories of nation, nationalism, postcolonialism, and transnationalism. Specific attention to the relationship between cultural production and the formation of ideas about nation and nationalism, including examination of both "legitimizing" and resistant discourses. Not offered every year.—III. (III.)

212. Studies in the Rhetorics of Culture (4)
Lecture/discussion—4 hours. Prerequisite: course 200A (may be taken concurrently) or consent of instructor. Survey of critical and analytical approaches to the study of texts. Examination of multi-mediated objects to understand their cultural import by focusing on discursive production, dispersal, and reception processes, and related shifts in power relations. Not offered every year.—I. (I.)

214. Studies in Political and Cultural Representations (4)
Lecture/discussion—4 hours. Prerequisite: course 200A (may be taken concurrently) and consent of graduate adviser. Framework for the analysis of political and popular cultural representations. Emphasis on concepts, theories, and methodologies illuminating dominant and vernacular cultural representation, appropriation, and innovation in transnational contexts. May be repeated for credit up to 4 times when topic differs. Not offered every year.—II. (II.)

250. Research Seminar (4)
Seminar—4 hours. Prerequisite: courses 200A, 200B, 200C or consent of instructor. Designed to facilitate student interaction and promote student research by guiding students through the production of a publishable essay. Essays submitted, distributed, and discussed by seminar participants. May be repeated up to 12 units of credit.—II. (II.)

270A-270B-270C. Individually Guided Research in Cultural Studies (4-4-4)
Discussion—1 hour; independent study—2 hours; extensive writing. Prerequisite: course 200C, 250, consent of instructor. Individually guided research, under the supervision of a faculty member, on a Cultural Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus.—I, II, III. (I, II, III.)

290. Colloquium (1)
Lecture—1 hour. Prerequisite: graduate standing or consent of instructor. Designed to provide cohort identity and faculty student exchange. Opportunity to present papers, hear guest lecturers, and see faculty presentations, gather for organizational and administrative news, exchange information, and make announcements. May be repeated up to 12 units of credit. (S/U grading only.)—I, II, III. (I, II, III.)

295. Special Topics (4)
Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Special topics courses offered according to faculty and student interests and demands. May be repeated for credit with consent of adviser.—I, II, III. (I, II, III.)

298. Group Research (1-5)
(S/U grading only.)—I, II, III. (I, II, III.)

299. Directed Research (1-5)
(S/U grading only.)—I, II, III. (I, II, III.)

299D. Dissertation Research (1-12)
Independent study—3-36 hours. Prerequisite: advancement to doctoral candidacy. (S/U grading only.)—I, II, III. (I, II, III.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Dermatology

See Medicine, School of, on page 380.

Design

(College of Letters and Science)

Timothy McNeil, M.A., Program Director

Program Office. 105 Art Building
(530) 752-2004; *http://design.ucdavis.edu*

Faculty

Susan Avila, M.F.A., Associate Professor
Christina Cogdell, Ph.D., Associate Professor
Glenda Drew, M.A., Associate Professor
James Housefield, Ph.D., Assistant Professor
Mihyun Kang, Ph.D., Assistant Professor
Mark Kessler, M.Arch., Assistant Professor
Timothy McNeil, M.A., Associate Professor
Konstantinos Papamichael, Ph.D., Professor
Ann Savageau, M.F.A., Associate Professor
Michael Siminovitch, Ph.D., Professor
Kathryn Sylva, M.F.A., Associate Professor
Susan Verba, M.F.A., Assistant Professor

Emeriti Faculty

Richard Berteaux, B.Arch., M.S., Professor Emeritus
Frances Butler, M.A., Professor Emerita
Dolph Gotelli, M.A., Professor Emeritus
Patricia Harrison, M.Arch., Professor Emerita
Gyongy Laky, M.A., Professor Emerita
Helge B. Olsen, Senior Lecturer Emeritus
Victoria Z. Rivers, M.A.C.T., S.C.T., Professor Emerita
Katherine W. Rossbach, M.A., Professor Emerita
Barbara Shawcroft, M.F.A., Professor Emerita
JoAnn C. Stabb, M.A., Senior Lecturer Emerita

Affiliated Faculty

Barbara Molloy, M.F.A., Lecturer
Bob Morgan, B.S., Lecturer
Gale Okumura, B.A., Lecturer
D.R. Wagner, M.F.A., Lecturer
Adele Zhang, M.F.A., Design Collection Curator

The Major Program

The Design program offers a creative, challenging, and flexible approach to the study of design with emphasis on socially responsible, human centered, and sustainable practice.

The Program. Foundation courses, Design and Visual Culture; Design Drawing; Form and Color; and Graphic Design and Computer Technology, are required of all design majors. One additional course in the student's area of interest is required for Preparatory Subject Matter. Depth Subject Matter courses provide: (*1*) further exploration of design principles and conceptual, formal and technical issues; (*2*) conceptual and critical development are stressed through a series of history and theory classes; (*3*) in-depth studio experience with projects that demonstrate a research-based, iterative design process. Optional capstone class. A more detailed explanation is available through the Design Advising office in 105 Art Building (530) 752-1165.

Portfolios. Portfolios are not required for admission to the major. However, admitted students are required to keep a continuing portfolio of their creative work to be evaluated by faculty for the purposes of requesting independent study or other similar courses, and applying for internships.

Internships, Careers, and Study Abroad. Design students are encouraged to supplement their coursework with internships in design firms, museums, and galleries. Design graduates go directly from this program into further graduate study, or professional work including clothing, graphic design, interior design and architectural firms, exhibition design firms, display work in galleries and museums, and theatrical and textile companies. In addition, students have become entrepreneurs through freelance and commissioned work in many related areas. The Design Program encourages students to experience design abroad through a variety of sponsored programs. For more information, contact the Education Abroad Center.

A.B. Major Requirements:

UNITS

Interior Architecture emphasis:

Preparatory Subject Matter 24
- Design 1 4
- Three courses from the following: Art 2 or Design 14; Design 15, 16. 12
- Design 40A or 40B 4
- One course from the following: Art 9; Design 13, 21, 50, 60, 70, 77..... 4

Depth Subject Matter 44
- Two courses, at least one of which must be a Design course, from the following: Art 110A, 110B; Design 107, 113, 115, 127B, 150A; Dramatic Art 128; Technocultural Studies 100..... 8
- Three courses, at least two of which must be Design courses, from the following: Art History 168, 184, 187, 188A, 188B, 189; Design 127A, 138, 142A, 142B, 143, 144, 145; Dramatic Art 114, 150, 155; Technocultural Studies 150, 152, 153, 155, 159 12
- Choose either six courses from List A below, or five courses from List A and one course from List B 24
  - **List A.** Electives: Design 116, 117, 131, 132A, 132B, 134A, 134B, 135A, 135B, 136A, 136B, 137A, 137B, 150B, 151, 155A, 157, 160, 161, 170, 171, 177, 180A, 185, 186, 191
  - One course from the following approved list may count for List A: ART 113, Chicano Studies 172, Dramatic Art 124A, 124B, 124C, 124E, 170
  - **List B.** Capstone Course Option: Design 154, 179, 180B, 187
- Note. Substitutions for the listed courses may be allowed under certain circumstances with prior departmental approval.

Total Units for the Major 68

Major Adviser. Information on the current Academic Advisers can be obtained by contacting the Undergraduate Adviser at (530) 752-1165.

Graduate Study. The graduate program in Design leading to the Master of Fine Arts degree offers students opportunities for independent, creative, innovative interdisciplinary study combining design with anthropology, critical theory, consumer issues, art, engineering, the sciences and theater. Faculty work closely with students to build individual programs based upon a student's specialized goals and interests in design. Study in new technologies and experimental approaches are encouraged. Areas of emphasis include textiles, fashion, visual communication (including print, screen, and environmental graphics), exhibition design, interior architecture, and lighting. For more information, see the program website at *http://mfa-design.ucdavis.edu*.

Graduate Adviser. Please contact the Program at (530) 752-8710.

Courses in Design (DES)

Questions pertaining to the following courses should be directed to the instructor or to the Design Advising office in 152 Walker Hall (530) 752-1165. Scheduling of classes is subject to change; please contact the Advising office to confirm when a course is offered.

Lower Division Courses

1. Introduction to Design (4)
Lecture—4 hours. Introduction to the design discipline through readings, writing, visual problem solving, and critical analysis. Topics: design principles and elements, vocabulary, color theory, Gestalt principles, conceptualization strategies. Role of designer and products in contemporary culture including social responsibility and sustainability.—I. (I.) Sylva

13. Photography for Designers (4)
Lecture—2 hours; studio—6 hours. Prerequisite: course 1, 14, 15. Priority to Junior Design majors. Photography for designers with emphasis on 35mm camera photography, black and white processes, and darkroom techniques. Digital photography, critical analysis of photographs, and the role of photography in society.—II, IV. (II, IV.) Sylva

14. Design Drawing (4)
Studio—5 hours; lecture—2 hours. Prerequisite: course 1; students with a background in drawing or Advanced Placement Art Studio units are encouraged to submit a portfolio for review to waive this course. Priority to Design majors. Drawing as a tool for design. Basic skills in objective observation and representation, including line, shape, tone, and space. Drawing as a tool for formulating and working through design problems.

15. Form and Color (4)
Studio—5 hours; lecture—2 hours. Prerequisite: course 1, 14 or consent of instructor. Priority to Design majors. Understanding color, form and composition as ways of communicating design concepts and content. Color theory, color mixing, interaction of color. Explores a variety of materials, media and presentation techniques.

16. Graphic Design and Computer Technology (4)
Lecture—2 hours; studio—5 hours. Prerequisite: course 1, 14, 15. Priority given to sophomore and junior Design students. Computer software for creative design development, applications of design theory, principles of color, visual organization, visual hierarchy, typography, image enhancement. Projects created on Macintosh computers.—I, II, III, IV. (I, II, III, IV.) Sylva

21. Drafting and Perspective (4)
Lecture—2 hours; studio—5 hours. Prerequisite: course in drawing recommended. Priority to Design majors. Exploration of the process of visual presentation through methods of orthographic projection and perspective drawing. Introduction to presentation skills. IV. (IV.)

40A. History of Design: Ancient through Industrial Revolution (4)
Lecture—4 hours. Prerequisite: course 1. Priority to Design majors. A social and stylistic history of design (crafts and industrial products, costume, architecture, landscape, graphics) up to the 19th century. Emphasis on changing methods of design and production in the 19th century. Field trip required. Not open for credit to students who have completed course 40 or course 140.—I, IV. (I, IV.)

40B. History of Modern Design (4)
Lecture—4 hours. Prerequisite: course 1; course 40A or art history (ancient through 19th century) recommended or consent of instructor. Priority given to Design majors. A social and stylistic history of design (crafts and industrial products, costume, architecture, landscape, visual communication) from the mid-nineteenth century to the present. Emphasis on design reform and the growth of modernism in Europe and America. Field trip required.—II. (II.)

50. Model Making (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15, 21 or consent of instructor. Priority to Design majors. Introduction to concepts, methods and materials for model making in design. The use of models for idea generation, as well as specifics for study models, semi-detailed and presentation models.—Kessler

60. Introduction to Surface Design (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15. Priority to Design majors. Introduction to diverse methods for creating imagery, patterns, and textures on cloth. Explorations and experimentation with dyes and pigments, mechanical resists, color removing, and physical and chemical alterations of textile surfaces and structures.

70. Introduction to Textile Design Structures (4)
Lecture—2 hours; studio—5 hours. Prerequisite: course 1. Priority given to Design majors. Introduction to diverse methods for creating textile structures. Exploration of the creative potential of hand-constructed textiles, manipulation of fabric to create dimensional surfaces, and the basics of building and joining fabric structures. Only two units of credit to students who have completed courses 23 or 24. Not open for credit for students who have completed both 23 and 24.—Savageau

77. Introduction to Structural Design for Fashion (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15, 70. Priority given to Design majors. The study and practice of designing clothing for the human body. Emphasis on flat pattern development, structural joining sequences and the development of three-dimensional garments from two-dimensional drawings. Not open for credit to students who have completed course 77A.

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

107. Advanced Structural Design for Fashion (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15, 70, 77 (77A also acceptable) or consent of instructor. Priority to Design majors. Advanced study and practice of designing clothing for the human body through pattern development and structural joining. Emphasis on draping techniques and advanced conceptualization for fashion design. Not open for credit to students who have taken course 77B.

113. Visual Communication: Digital Imaging (4)
Lecture—2 hour; studio—5 hours. Prerequisite: courses 1, 13, 15, 16, or consent of instructor; priority to Design majors. Digital imaging for designers, combining theoretical perspectives with practical applications. Expansion of use and meaning of the single photographic image through collage techniques, grids, triptychs and image sequencing. Alteration of image meaning through the addition of text.—Sylva

115. Letterforms and Typography (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15, 16. Fundamentals of letterforms and typography. Characteristics of typefaces, formatting and composition of type. Principles of legibility, visual hierarchy, rules and blocks, grids, and integration of type with images. Not available for credit to students having completed course 22.

116. Visual Communication: Graphic Design Studio (4)
Studio—5 hours; lecture—2 hours. Prerequisite: courses 1, 13, 14, 15, 16, 113, 115. Priority to Design majors. Through multiple, conceptually-linked assignments, this course focuses on the fundamental choices designers make in translating concepts into graphic form, taking projects from initial concept and research, to design strategies, to project resolution and audience reception. Not open for credit to students who have completed course 152 or 152A.

117. Visual Communication: Internet and Interactive Design (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 13, 14, 15, 16, 113, and 115. Priority to Design majors. Technical and conceptual aspects of creating interactive visual media for screen-based delivery, concentrating on web sites. Attention to conceptual framework, visual design, information architecture and interactivity. Researched and written pre-production materials required. Not open for credit to students who have completed course 153.

127A. Sustainable Design (4)
Lecture—4 hours. Prerequisite: course 1; 14, 15, and 16 recommended. Principles, practice and materials of contemporary sustainable design in the context of environmental crisis. History of sustainable design in relation to the fields of textiles, visual communication, interior architecture, exhibition design and lighting. Only two units of credit for students who have completed course 127.—II. (II.) Savageau

127B. Studio Practice in Sustainable Design (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15, 16 and 127A. Analysis and practice of sustainable design within studio context. Design project that incorporate the reuse of post consumer waste; standard materials vs. sustainable materials; Cradle to Cradle philosophy and practice; biomimicry; Life Cycle Analysis. Required field trips. Not open for credit for students who have completed course 127.—III. (III.) Savageau

131. Global Fashion and Product Design (4)
Studio—8 hours. Prerequisite: course 1, 60, 77, and 107. Priority given to Design, Textiles and Clothing, and Theater majors. Exploration of materials, embellishments, and structural techniques derived from historic and contemporary world cultures. Emphasis on unique qualities of individual expression applied to hand made textiles, fashion and textile products.

132A. Textile Design: Woven Structures (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15, 16, 70. Introduction to handweaving techniques, tools and vocabulary. Emphasis on yarn identification, basic drafting by hand, and computer drafting using textile design software. Exploration of woven structures, pattern, and color effects. Field trip required. May be repeated one time for credit with permission of instructor.

132B. Loom-Constructed Textile Design (4)
Studio—8 hours. Prerequisite: course 132A. Intermediate level study of complex fabric structure with emphasis on pattern in relation to surface, dimension, and material.

134A. Introduction to Interior Design—Residential (4)
Lecture/discussion—2 hours; studio—5 hours. Prerequisite: course 1, 14, 15, 16, and 21. Introduction to the theory and practice of interior design with focus on residential spaces. Basic methods of design conceptualization, development, and presentation. For Design majors only.—Kessler

134B. Introduction to Interior Design—Commercial and Technical Spaces (4)
Studio—5 hours; lecture/discussion—2 hours. Prerequisite: Course 1, 14, 15, 16, 21, 134A. Introduction to the theory and practice of interior design with focus on small commercial and technical spaces. Archetypal spaces, non-residential building systems, ADA accessibility, design programming and research methods. Priority to Design majors.—Kessler

135A. Furniture Design (4)
Lecture—2 hours; studio—5 hours. Prerequisite: course 21; course 134A recommended. Priority to Design majors. Development of designs for contemporary furniture. Consideration of behavioral and physical requirements, cultural and historic expression, and structural and aesthetic qualities. Research, drawings, and constructions of scale models. Field trip required.—II. (II.)

135B. Furniture Design (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 21 and 135A; course 134A recommended; or consent of instructor. Design and construction of full-size prototype furniture based on preliminary work completed in course 135A. Material technology, construction methods, and finishes discussed. Development of shop drawings and furniture construction project.—III. (III.)

136A. Lighting Technology and Interior Design (4)
Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: courses 1, 14, 16, 21; courses 134A and 134B recommended; consent of instructor. Priority given to Design majors. Introduction to lighting design and technology. Understanding the role of lighting in the development of functional and aesthetically pleasing environments. Energy efficiency in lighting. Limited enrollment.—Siminovitch

136B. Designing with Light (4)
Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: courses 1, 14, 16, 21, 136A; courses 134A and 134B recommended; consent of instructor. Priority given to Design majors. Design and manipulation of light sources, luminaires, and lighting controls to enhance the functional and aesthetic impact of interior and exterior spaces. Design projects explore lighting effects, light distribution characteristics, and lunminaire design. Limited enrollment.—Siminovitch

137A. Principles of Daylighting (4)
Lecture/discussion—3 hours; studio—4 hours. Prerequisite: courses 1, 14, 15, 16, 21, 134A and 134B or consent of instructor; course 50 recommended. Priority given to Design and Engineering majors. The impact of natural light on the built environment and methods to control glare and maximize energy savings.—Papamichael

137B. Daylighting Design Studio (4)
Lecture/discussion—3 hours; studio—4 hours. Prerequisite: course 137A; courses 136A and 136B recommended. Daylighting design issues; ambient and task lighting; lighting requirements in residential, commercial, and industrial applications; daylight analysis and design; side and top lighting; glazing selection; shading systems; integration with electric lighting; daylighting and energy efficiency; photo-sensor lighting controls. Limited enrollment. GE Credit: ArtHum or SciEng.—Papamichael

138. Materials and Methods in Interior Design (4)
Lecture/discussion—3 hours; project—1 hour. Prerequisite: course 1, 14, 15, and 21. Introduction to the finish materials used for interior design with special emphasis on sustainable and recycled products. Performance factors, relative costs and energy impacts, installation conditions and construction details, and design potential for a full range of interior materials. Two field trips required. Offered in alternate years.

142A. World Textiles: Eastern Hemisphere (4)
Lecture—4 hours. Prerequisite: course 1; Art History 1A, 1B, 1C, or 1D recommended. Social contexts, meanings, aesthetics, stylistic developments, and methods significant in eastern hemisphere textiles. Emphasis on Japan, China, Indonesia, Oceania, Southern and Central Asia, Africa. GE credit: ArtHum, Div.—Rivers

142B. World Textiles: Western Hemisphere (4)
Lecture—4 hours. Prerequisite: course 1, Art History 1A, 1B, or 1C recommended. Social context, aesthetics, stylistic developments and methods significant in western hemisphere textiles. Emphasis on the Middle East, Europe, and the Americas up to contemporary times. Two required field trips. GE credit: ArtHum, Div.—Savageau

143. History of Fashion (4)
Lecture—4 hours. Prerequisite: course 1; course 40A or 40B recommended. Priority to upper division Design majors.History of fashion from the earliest times to the present with emphasis on both aesthetic and functional aspects. GE credit: ArtHum.—Avila

144. History of Interior Design (4)
Lecture—4 hours. Prerequisite: course 40A or 40B; Art History 1C recommended. Priority to Design majors. History of interior design in Europe and America from the classical period to modern times. Emphasis on the dwelling in its cultural setting and the development of the theory of modern interior design. One all-day field trip required. GE credit: ArtHum, Wrt.

145. History of Visual Communication (4)
Lecture—4 hours. Prerequisite: Art History 1A, 1B, or 1C; course 1; course 40 recommended. Priority to Design majors. Historical developments of visual communication, concentrating on the technological and aesthetic development of graphic design; origins and manifestations of current issues in visual communication; provide framework for analysis of current and future trends in visual communication.

150A. Computer-Assisted Drawing for Designers (4)
Lecture—2 hours; studio—4 hours. Prerequisite: course 16 and 21 or consent of instructor. Priority to Design majors. Computer assisted drawing and modeling using a mid-level, multi-use CAD program. Basic architectural drawing and modeling technique in both two-dimensional and three-dimensional CAD environments. Not open for credit to students who have taken course 150.

150B. Computer-Assisted Presentations for Interior Architecture (4)
Lecture—2 hours; studio—4 hours. Prerequisite: course 16 and 150A or consent of instructor. Priority to Design majors. Computer-assisted architectural presentation including the development of complex 3D models, techniques of photo-realistic rendering and computer simulation of movement through architectural and interior space.

151. Visual Communication: Type in Motion (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15, 16, 113, 115. Priority to Design majors. Fundamentals of creating motion-based, screen-based typography. Consideration of narrative structures, movement assemblage, and other visual languages, synthesized within a nuanced understanding of typography within digital space.—I. (I.) Drew

154. Visual Communication: Message Campaign Design (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 13, 14, 15, 16, 113, 115, 116. Priority to Design majors. Principles and application of visual design strategies for advertising. Emphasis on promotion of design for social change. Creation of public visual-media campaign. Not open for credit to students who have completed course 152B.—Sylva

155A. Topics Studio: Pattern, Form and Surface (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 13, 14, 15, 16, 113, 115, 116. Priority to Design majors. Design approaches in visual communications arising from a critical examination of the history of form, pattern, and surface in design disciplines. Through experimentation and exploration, students will develop non-traditional working methods to arrive at innovative solutions to traditional graphic media.

156B. Visual Presentation: Visual Merchandising (4)
Studio—8 hours. Prerequisite: course 14 and 15 or consent of instructor. Priority to Design majors. Design and placement of objects in spatial relationships that enhance non-verbal communication. Three-dimensional design as visual merchandising. Not open for credit to students who have completed course 126A. Field trips required.—I, IV. (II.) Gotelli

157. Visual Communications: Intermediate Internet and Interactive Design (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 13, 14, 15, 16, 113, 115, 117. Priority given to Design majors. Technical and conceptual aspects of creating web sites that address current trends, such as CSS for type and position and interactivity with ActionScript. Attention to conceptual framework, visual design and user interaction design. Research and written pre-production materials required. Not open for credit to students who have completed course the 191C version of this course.—Drew

160. Textile Surface Design: Patterns and Resists (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15, 70. Priority given to Design majors. Use of traditional and contemporary processes to create images and patterns on fabric using disperse, fiber-reactive, vat, acid dyes, and textile pigments. Emphasis on individual exploration and interpretation of processes and techniques. Not open for credit to students who have completed course 160A.—Rivers

161. Textile Surface Design: Screen and Digital Printing (4)
Studio—5 hours; lecture—2 hours. Prerequisite: courses 1, 13, 14, 15, 16, 160 or consent of instructor. Priority given to Design majors. Design of textiles and screen printing on fabrics; soft-product development; integration of hand-produced and digitally generated imagery on cloth. Not open for credit to students who have completed course 160B.—Rivers

170. Experimental Fashion Design (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15, 16, 70, 77, 107. Priority given to Design majors. Fashion design as a vehicle for contemporary self expression. Emphasis on developing two-dimensional conceptualization of ideas and translating them into one-of-a-kind garments utilizing new fabric technologies and archetypal forms. Field trip required. Not open for credit to students who have completed course 170A.—Avila

171. Fashion Drawing: Technical and Illustration (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15, 16, 77. Priority to Design majors. Exploration of fashion design processes for industry within the social and physical context. Emphasis on two-dimensional conceptualization of ideas, garment construction, and ideation processes utilizing commercial textiles. Field Trip required. Not open for credit to students who have completed course 170B.

177. Computer-Assisted Fashion Design (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 1, 14, 15, 16, 77, 107 required; 170, 171 recommended. Priority to Design majors. Advanced exploration of apparel design processes for industry and personal expression with emphasis on computer-assisted design applications. Field trip required.—Avila

179. Fashion Design: Signature Collection (4)
Lecture/discussion—3.5 hours; studio—3.5 hours. Prerequisite: courses 1, 14, 15, 16, 70, 77, 107, 170; consent of instructor. Priority to Senior Design majors. Advanced exploration of fashion design with an emphasis on professional portfolio development and presentation. Emphasis on conceptualizing, designing, and fabricating a cohesive line of wearable garments suitable for presenting in a public fashion show. May be repeated one time for credit. Not open for credit to students who have taken more than eight units of course 191A.—Avila

180A. Advanced Interior Design: Institutional Spaces (4)
Lecture/discussion—2 hours; studio—5 hours. Prerequisite: courses 1, 16, 21, 134A, 134B; courses 138, 144 and 150A highly recommended; consent of instructor. Priority given to Design majors. Advanced interior design problems focused on complex institutional spaces. Introduction to building codes related to interior design. Integration of building systems with interior design solutions.—Kessler

180B. Advanced Interior Architecture (4)
Lecture—2 hours; studio—5 hours. Prerequisite: courses 134A, 134B, 180A and senior standing; priority to Design majors. Advanced problems in interior architectural design emphasizing space planning for corporate and institutional environments. Field trips required.—Kessler

185. Exhibition Design (4)
Lecture—2 hours; studio—5 hours. Prerequisite: course 1, 14, 15, 16, 21, 50, 150A or consent of instructor; priority given to Design majors. Design of museum and commercial exhibition environments. Exhibition research, concept development and object selection, spatial planning, display furniture, object placement and staging, interpretive strategies and architectural finishes.—McNeil

186. Environmental Graphic Design (4)
Lecture—2 hours; studio—5 hours. Prerequisite: course 1, 14, 15, 16, 50, 115 or consent of instructor; course 21 recommended; priority given to Design majors. Design of informational and directional graphics for the built environment. Application and integration of typography, imagery and symbols into the architectural landscape. Development of universal wayfinding and graphic navigational systems to help people find their way.—McNeil

187. Narrative Environments (4)
Lecture—2 hours; studio—5 hours. Prerequisite: course 185 or 186 or consent of instructor; priority given to Design majors. Design of narrative environments and multi-sensory experiences for cultural, commercial, entertainment and public spaces. Interpretive planning and design for specific exhibit audiences. The manipulation of objects and the communication of complex ideas in the exhibition environment.—McNeil

190. Proseminar (1)
Seminar—1 hour. Prerequisite: design major or consent of instructor. Philosophies of design explored through discussion and presentation of research results. May be repeated three times for credit. (P/NP grading only.)

191A-D. Workshops in Design (4-12)
Seminar—1 hour; studio or field experience—3 hours per unit (units determined by instructor and student); field trip. Prerequisite: course 14, 15; upper division standing and consent of instructor. Faculty initiated workshops featuring advanced studies and applications of original work in Design: (A) Costume; (B) Environment; (C) Graphics; (D) Textiles. Credit limited to 12 units in one section or a combination of sections. Letter grading by contract. Field trips included.

192. Internship (1-6)
Internship—3–18 hours. Prerequisite: completion of 84 units and consent of instructor. Supervised internship, off and on campus, in areas of design including environmental, costume, textile, museum, display and interior design. Enrollment limited to 3 units per quarter or 6 units per IV session. (P/NP grading only.)

197T. Tutoring in Design (1-5)
Discussion—3-15 hours. Prerequisite: upper division standing and consent of instructor. Leading of small discussion groups or studio meetings affiliated with one of the department's regular courses. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study of Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

221. Theory and Issues in Design (4)
Seminar—3 hours; independent study. Prerequisite: graduate standing in Design or consent of instructor. Perspectives on theoretical and aesthetic issues related to the design professions such as methodology in historical and contemporary contexts, implications of technology on design theory and practice, and design relationships to environmental sustainability, recycling, and other social issues. May be repeated one time for credit.—I. (I.)

222. Research Methods and Critical Writing for Design (4)
Seminar—3 hours; independent study. Prerequisite: course 221; graduate standing in Design or consent of instructor. Focused on research methods and critical writing related to design topics including case studies, original and secondary sources, critical reviews. Expectation of a paper meeting professional standards suitable for publication from each student at end of course. May be repeated one time for credit.—II. (II.)

223. Professional Practice and Ethics in Design (4)
Seminar—3 hours; independent study. Prerequisite: courses 221, 222; graduate standing in Design or consent of instructor. Introduce students to issues of professional design practice: business ethics, contracts and business practices, social responsibility through case studies, guest lectures and field trips, and readings. Short written assignments and presentations will be required.—III. (III.)

224. Seminar in Design Research and Teaching (4)
Independent study—6 hours; extensive writing—4 hours; discussion—2 hours. Prerequisite: courses 221, 222, 223; concurrent academic appointment (TA) in courses 142A, 142B, 143, 144, 145; graduate standing in Design; consent of instructor. Student will work closely with instructor on a research and writing project related to subject matter of undergraduate history courses noted above with the goal of introducing student to advanced historical research processes and development of writing skills. May be repeated two times for credit.—I, II, III. (I, II, III.)

290. Seminar in Design (4)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Selected topics in design methodology, research, communication, and education. May be repeated for credit.—III. (III.)

292. Practicum in Textile Arts/Costume Design (1-12)
Prerequisite: graduate standing in Textile Arts and Costume Design or consent of instructor. Interaction with a working professional in the student's field of interest to apply theories and concepts to working practice. (S/U grading only.)

298. Directed Group Study for Graduate Students (1-5)
Studio. Prerequisite: consent of instructor. (S/U grading only.)

299. Individual Focused Study (1-12)
Prerequisite: graduate standing in Textile Arts and Costume Design or consent of instructor. Advanced study in studio practice on independent projects with faculty consultation. May be repeated for credit.

299D. Project Concentration (1-12)
Prerequisite: graduate standing in Textile Arts and Costume Design or consent of instructor. A minimum of 22 units must be taken in Project Concentration and Individual Focused Study. Student creates a body of original work at a professional level, with written and visual documentation of process and concepts underlying the project, culminating in public presentation. (S/U grading only.)—III. (III.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Dietetics

See Clinical Nutrition, on page 195.

Dramatic Art

See Theatre and Dance, on page 507.

Earth Sciences

See Environmental and Resource Sciences, on page 288; Geology, on page 315; Hydrologic Sciences (A Graduate Group), on page 338; Hydrology, on page 339; Soil and Water Science, on page 494; and Soil Science, on page 493.

East Asian Languages and Cultures

(College of Letters and Science)

Xiaomei Chen, Ph. D., Chairperson of the Department

Department Office. 209 Sproul Hall
(530) 752-4999;
http://chinese.ucdavis.edu;
http://japanese.ucdavis.edu

Faculty

Chia-ning Chang, Ph.D., Professor *(Japanese)*
Xiaomei Chen, Ph.D., Professor *(Chinese)*
Chengzhi Chu, Ph.D., Associate Professor *(Chinese)*
David Gundry, Ph.D., Assistant Professor *(Japanese)*
Mark Halperin, Ph.D., Associate Professor *(Chinese)*
Joseph Sorensen, Ph.D., Assistant Professor *(Japanese)*
Michelle Yeh, Ph.D., Professor *(Chinese)*

Emeriti Faculty

Robert Borgen, Ph.D, Professor Emeritus
Donald A. Gibbs, Ph.D., Professor Emeritus
Key H. Kim, Ph.D., Professor Emeritus
Benjamin E. Wallacker, Ph.D., Professor Emeritus

Affiliated Faculty

Kazue Chavez, Lecturer *(Japanese)*
David Fahy, Lecturer *(Japanese)*
Junko Ito, Lecturer *(Japanese)*
Jincheng Liu, Lecturer *(Chinese)*
Ling-Yu Lu, Lecturer *(Chinese)*
Mayumi Saito, Lecturer *(Japanese)*
Haruko Sakakibara, Lecturer *(Japanese)*
Ritsuko Shigeyama, Lecturer *(Japanese)*
Miyo Uchida, Lecturer *(Japanese)*
Chunxia Wang, Lecturer *(Chinese)*
Ju-Yin Wang, Lecturer *(Chinese)*
Shan Xiang, Lecturer *(Chinese)*
Yang Xiao, Lecturer *(Chinese)*
Binbin Yang, Lecturer *(Chinese)*

The Major Program

The department offers a core language program in both Chinese and Japanese and courses in literature and culture. The core language program in Chinese has two tracks: one for students who have no background whatsoever and one for students with prior language background.

The Program. A student elects to major in either Japanese or Chinese. Practical language skills are taught using the most modern methods so that upon entering the upper division a student will have attained substantial fluency in the spoken language (hearing and speaking) and the written language (reading and writing). Upper division courses balance the need to further language skills with the need to understand and appreciate the cultural richness of either Chinese or Japanese civilization. All students are encouraged to combine their study of Japan's or China's language and literature with courses in related fields, and to study abroad through the Education Abroad Program, the UC International Summer Session programs, or through internships.

Career Opportunities. UC Davis graduates have learned that a major in Chinese or Japanese is a genuine, earned distinction that facilitates entrance to graduate programs and professional schools. In addition, job opportunities abound in virtually all career paths, especially for those who have completed study abroad.

Chinese

A.B. Major Requirements:

UNITS

Preparatory Subject Matter.....0-30
Chinese 1, 2, 3, 4, 5, 6; or 1BL, 2BL, 3BL; or 1CN, 2CN, 3CN.
Recommended:
Chinese 10, 11, 50, Comparative Literature 14, Japanese 10, Linguistics 1, History 9A.

Depth Subject Matter 44
Chinese 106, 107, 111, 112, 113, 114, 160 28
Note: With prior approval of an undergraduate adviser, students already proficient in Chinese at the third-year level (courses 111-112-113) should take three other upper division Chinese courses instead.
Four courses selected from Chinese 100A, 101, 102, 103, 104, 105, 108, 109A-I, 110, 115, 116, 120, 130, 131, 132, 140; one of the four courses must be from 101, 102, 103, 104, 109G.....16
Recommended:
Japanese 101, 102, 103, 104, 105, 106; Anthropology 148A-148B; Art History 163A-163B; East Asian Studies 113; History 191A-F; Religious Studies 172; or other advanced literature and culture courses selected in consultation with the undergraduate adviser.

Total Units for the Chinese Major.....56-74

Japanese

A.B. Major Requirements:

UNITS

Preparatory Subject Matter.....0-30
Japanese 1, 2, 3, 4, 5, 6
Recommended:
Japanese 10, 15, 25, Chinese 10, 11, 50, Linguistics 1, History 9B.

Depth Subject Matter 40
Japanese 101, 102, 103, 111, 112, 113 24
Eight units selected from Japanese 104, 105, 106, 107, 108, 109, 115, 131, 132, 133, 134, 135, 136, 141 8
Eight units selected from Chinese 104, 105, 106, 107, 108, 109A–I, 110; Anthropology 149A-149B; Art History 164; Comparative

Literature 153; History 194A-194B-194C; Religious Studies 170, 172; or other advanced literature and culture courses selected in consultation with the undergraduate adviser 8

Total Units for the Japanese Major .. 40-70

Major Advisers. J. Sorensen *(Japanese)*, M. Yeh, X. Chen *(Chinese)*

Minor Program Requirements:

Minors are offered in Chinese and in Japanese for students wishing to follow a formally recognized program of study in those languages and their literatures.

UNITS

Chinese 20

Japanese 20

All upper division courses, including both language courses and literature in translation courses, may be used to meet this requirement. One approved lower division course (Chinese 10, 11, 50; Japanese 10, 25, 50) may also be used. In addition, students must demonstrate their language proficiency, normally through completion of Chinese 111 or Japanese 111. Only four units from 192, 197T, 198, and 199 may be applied to the minor. For details, consult the undergraduate advisers.

Honors Program. Candidates for high or highest honors in Chinese or Japanese must enroll in CHN 199 or JPN 199 and complete a research project or a scholarly paper under the direction of a faculty member. The project will have a minimum duration of two quarters and carry a minimum of 6 units of credit. Additionally, entrance into the honors program requires completion of at least 135 units with a minimum GPA of 3.500 in courses counted toward the major. Interested students should consult with faculty in their field of interest in their junior year and undertake their project during the first two quarters of their senior year. Other arrangements must be authorized in advance by the department chair.

Students who complete the honors thesis receive departmental citation, and if their overall GPA qualifies them, may be recommended by the faculty for honors, high honors or highest honors at graduation.

Education Abroad Program. The university maintains study abroad programs in China, Japan, Hong Kong, and Taiwan. They offer excellent opportunities for students to polish their language skills and experience Asian cultures firsthand. Students are encouraged to participate. Appropriate courses taken abroad can be applied toward the major or the minor. For details, see the department's undergraduate adviser and the Education Abroad Program office.

Related Courses. See East Asian Studies course list.

Prerequisite Credit. No student may repeat a course if that course is a prerequisite for a course that has already been completed with a grade of *C–* or better.

Placement. Chinese 1 and Japanese 1 are intended for beginning students with no prior knowledge of those languages. Students who do have some knowledge but wish to improve their skills should meet with one of the advisers to discuss appropriate placement. Students must follow departmental guidelines for placement in all language courses and instructor approval is required for enrollment.

Backtracking. Satisfactory completion of a language course is evidence that a student's language skills are beyond the level of those expected in its prerequisite courses. Accordingly, students who have completed a language course cannot go back and take its prerequisites. If the prerequisite courses are required for the major, students may substitute other courses. Students who are not sure how this requirement applies to them should speak to the undergraduate adviser.

Waived Language Courses. Students with exceptional language ability may waive required language course. If lower division courses have been waived, students will not have to take courses in their place. If upper division courses have been waived, students can use other appropriate courses to earn the units they need to complete the major. Consult the undergraduate adviser regarding selection of appropriate courses.

Courses in Chinese (CHN)

Lower Division Courses

1. Elementary Chinese (5)
Lecture/discussion—5 hours. Introduction to Chinese grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed Chinese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)—I. (I.)

1A. Accelerated Intensive Elementary Chinese (15)
Lecture/discussion—15 hours. Prerequisite: placement exam required. Special nine week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Chinese grammar and development of all language skills in a cultural context with emphasis on communication. Not open for credit to students who have completed course 1, 2, or 3.—IV. (IV.)

1BL. Accelerated Written Chinese I (5)
Lecture—5 hours. Prerequisite: ability to speak and understand oral Chinese (Mandarin or dialect). Designed for students who already have some degree of fluency in spoken Chinese, but who cannot read Chinese characters. Concentrates on developing reading ability and accelerates progress to upper division. Not open for credit to students who have completed course 8. (Former course 8.)—I. (I.)

1CN. Mandarin for Cantonese Speakers I (5)
Lecture—5 hours. Prerequisite: ability to read and write Chinese characters at the elementary school level. Accelerated training in spoken Mandarin, particularly in the phonetic transcription system known as pinyin, for students who already can read and write Chinese. Course assumes no knowledge of spoken Mandarin Chinese. Not open for credit to students who have completed course 7. (Former course 7.)—I. (I.)

2. Elementary Chinese (5)
Lecture/discussion—5 hours. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.—II. (II.)

2BL. Accelerated Written Chinese II (5)
Lecture—5 hours. Prerequisite: course 1BL. Continuation of course 1BL. Designed to accelerate the progress of students who already know spoken Mandarin or a dialect but cannot read or write Chinese characters. Not open for credit to students who have completed course 18. (Former course 18.)—II. (II.)

2CN. Mandarin for Cantonese Speakers II (5)
Lecture—5 hours. Prerequisite: course 1CN. Continuation of course 1CN. Training in spoken Mandarin for students who already can read and write Chinese. Not open for credit to students who have completed course 17. (Former course 17.)—II. (II.)

3. Elementary Chinese (5)
Lecture/discussion—5 hours. Prerequisite: course 2. Continuation of course 2. Completion of grammar sequence and continuing practice of all language skills.—III. (III.)

3BL. Accelerated Written Chinese III (5)
Lecture—5 hours. Prerequisite: course 2BL. Advanced written styles and syntax in Chinese. Students completing this course proceed to course 111, which starts the third-year Chinese, or to some other appropriate upper-division course. Not open for credit to students who have completed course 28. (Former course 28.)—III. (III.)

3CN. Mandarin for Cantonese Speakers III (5)
Lecture—5 hours. Prerequisite: course 2CN. Continuation of course 2CN. Prepares students for entering upper division courses in Chinese. Not open for credit to students who have completed course 27. (Former course 27.)—III. (III.)

4. Intermediate Chinese (5)
Lecture/discussion—5 hours. Prerequisite: course 3 or the equivalent. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 3.—I. (I.)

4A. Accelerated Intensive Intermediate Chinese (15)
Lecture/discussion—15 hours. Prerequisite: course 3 or 1A or placement exam. Special nine week accelerated, intensive summer session course that combines the work of courses 4, 5, and 6. Intermediate-level training in spoken and written Chinese in cultural and communicative contexts, based on language skills developed in course 3 or 1A. Not open to students who have completed course 4, 5, or 6.—IV. (IV.)

5. Intermediate Chinese (5)
Lecture/discussion—5 hours. Prerequisite: course 4 or the equivalent. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 4.—II. (II.)

6. Intermediate Chinese (5)
Lecture/discussion—5 hours. Prerequisite: course 5 or the equivalent. Intermediate-level training in spoken and written Chinese in cultural contexts, based on language skills developed in course 5.—III. (III.)

10. Modern Chinese Literature (In English) (4)
Lecture—3 hours; term paper or discussion—1 hour. Introductory course requiring no knowledge of Chinese language or history. Reading and discussion of short stories and novels and viewing of two films. Designed to convey a feeling for what China has experienced in the twentieth century. Not open for credits to students who have already taken, or are taking concurrently, course 104. GE credit: ArtHum, Div, Wrt.—II. (I.) Chen

11. Great Books of China (in English) (4)
Lecture—3 hours; discussion—1 hour. Selected readings in English translation are supplemented with background information on periods, authors and the interrelationships of culture, literature and social change. Methods of analysis are introduced and applied in class discussions. GE credit: ArtHum, Div, Wrt.—I. (I.) Halperin

50. Introduction to the Literature of China and Japan (3)
Lecture—3 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation), including film. East Asian cultural traditions will also be introduced. (Same course as Japanese 50.) GE credit: ArtHum, Div, Wrt.—II. (II.) Yeh

98. Directed Group Study (1-5)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

100A. Chinese Intellectual Traditions: Daoist Traditions (4)
Lecture/discussion—4 hours. Prerequisite: course 11 or a course in Chinese history recommended. English-language survey of key Daoist texts and scholarship. Topics include Daoist concepts of the cosmos, the natural world, scripture, the body, and immortality; Daoist divinities; Daoism and the state. Offered in alternate years. GE Credit: ArtHum, Div, Wrt.—(II.) Halperin

101. Chinese Film (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: History 9A or any course on traditional China, upper division standing. English language survey of Chinese film, from its inception to the end of the twentieth century. Chinese films as important texts for understanding national, transnational, racial, gender, and class politics of modern China. GE credit; ArtHum, Div.—III. (III.) Chen

102. Chinese American Literature (in English) (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: a course in Chinese history recommended; upper division standing. English language survey of Chinese American literature which reflects cultural roots in China before immigration and the diaspora experience in the United States after immigration. Memory, nostalgia, national identities, cross-cultural communication, globalization, and trans-national politics. GE credit: ArtHum, Div, Wrt.—II, III. (II, III.) Chen

103. Modern Chinese Drama (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: a course in Chinese history recommended; upper-division standing. English language survey of modern Chinese spoken drama in the twentieth century and its major playwrights, in the context of Chinese history and the interaction of Chinese culture with other cultures. GE credit: ArtHum, Div, Wrt.—II, III. (II, III.) Chen

104. Modern Chinese Fiction (in English) (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 10 or a course in Chinese history recommended. English language survey of Chinese fiction as it evolved amidst the great historical, social and cultural changes of the twentieth century. Thorough study of the most influential writers and genres. GE credit: ArtHum, Div, Wrt.—III. (II.) Chen

105. Western Influences on Twentieth-Century Chinese Literature (in English) (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or History 9A recommended. Introduction of Western literary thought into modern China, the experimentation with Western literary forms and techniques, and the development of Marxism in contemporary literary writing. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—III.

106. Chinese Poetry (in English) (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: History 9A or any course on traditional China recommended. Organized topically and chronologically, the lyric tradition is explored from the dawn of folk songs down to modern expressions of social protest. Topics include friendship, love, oppression, war, parting, death, ecstasy and beauty. All readings are in English. GE credit: ArtHum, Div, Wrt.—I. (I.) Yeh

107. Traditional Chinese Fiction (in English) (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or a course in Chinese history. English-language course studying the dawn of Chinese fiction and its development down to modern times. Combines survey history with close reading of representative works such as The Story of the Stone and famous Ming-Qing short stories. GE credit: ArtHum, Div, Wrt.—II. (II.) Halperin

108. Poetry of China and Japan (in English) (4)
Lecture—3 hours; discussion—1 hour. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. Offered in alternate years. (Same course as Japanese 108.) GE credit: ArtHum, Div, Wrt.—II. (II.) Yeh

109A, C-E, G-I. Topics in Chinese Literature (in English) (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: depending on topic, course 10, 11, 104, 106, 107, or a course in Chinese history. Topics in Chinese literature may include: (A) crime and punishment; (C) women writers; (D) the knight-errant; (E) the city in fiction; (G) the literature of twentieth-century Taiwan; (H) popular literature; (I) the scholar and the courtesan. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(III.) Chen, Halperin, Yeh

110. Great Writers of China: Texts and Context (in English) (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: any course from the General Education Literature Preparation List, or consent of instructor. Examination of major theoretical concepts and interpretive methods in the study of literature by using examples from the Chinese tradition; discussions of classical and modern works with an emphasis on the relations between literature, author, society, and culture. GE credit: ArtHum, Div, Wrt.—I, II. (I, II.) Yeh

111. Modern Chinese: Reading and Discussion (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or the equivalent. Readings in modern Chinese newspaper articles, essays, and short stories, based on language skills developed in courses 1 through 6.—I. (I.)

112. Modern Chinese: Reading and Discussion (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 111. Readings in modern Chinese newspaper articles, essays, and short stories, based on language skills developed in course 111.—II. (II.)

113. Modern Chinese: Reading and Discussion (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 112. Readings in modern Chinese newspaper articles, essays, and short stories, based on language skills developed in course 112.—III. (III.)

114. Introduction to Classical Chinese: Confucius (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Texts from the Confucian canon are read with the assistance of prepared word glossaries so that while learning to read classical Chinese, the students also experience the most influential books in the history of China in their original texts.—I. (I.) Halperin

115. Introduction to Classical Chinese: Mencius (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 114. Continues course 114 by reading selections from the text of the Mencius.—II. (II.) Halperin

116. Introduction to Classical Chinese: Narrative Styles (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 115. Continues course 115 by reading selections from the Records of the Grand Historian and other early, influential works.—III. (III.) Halperin

120. Advanced Chinese (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or consent of instructor. Selected readings from all genres to develop advanced skills in reading, writing, aural comprehension, and translation. May be repeated one time for credit.—I, II, III. (I, II, III.)

130. Readings in Traditional Chinese Fiction (4)
Lecture—1 hour; discussion—3 hours. Prerequisite: course 112 or the equivalent; course 114 recommended. Close reading in Chinese of representative works from the Tang Dynasty (618-907) to modern times. May be repeated one time for credit when content varies.—II. (II.)

131. Readings in Traditional Chinese Poetry (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Traditional Chinese poetry from its beginnings to the golden ages of Tang and Song, surveying forms and poets that best reveal the Chinese poetic sensibility and the genius of the language of Chinese poetry.—I. (I.) Yeh

132. Readings in Modern Chinese Poetry (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Chinese poetry from the Literary Revolution of 1917 to the present, surveying works that embody exciting innovations and reflect the modernity of twentieth-century Chinese society and culture.—II. (II.) Yeh

140. Readings in Classical Chinese (4)
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Study and philological analysis of selected texts from the first millennium of Imperial China. May be repeated two times for credit.—I, II, III. (I, II, III.)

160. The Chinese Language (4)
Lecture/discussion—4 hours. Prerequisite: course 6 (may be taken concurrently); Linguistics 1 recommended. The Chinese language viewed in its linguistic context, synchronically and diachronically. Historical phonology, classical and literary language, rise of written vernacular, descriptive grammar of modern standard Chinese, dialectal variation, and sociolinguistic factors.—II, III. (II, III.)

192. Chinese Internship (1-12)
Internship—3-36 hours to be arranged. Prerequisite: upper division standing and consent of instructor. Work experience in the Chinese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.)

197T. Tutoring in Chinese (1-5)
Tutoring—1-5 hours. Prerequisite: consent of Department chairperson. Leading of small voluntary discussion groups affiliated with one of the Department's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. (P/NP grading only.)—Chu

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Course

299. Research (1-12)
(S/U grading only.)

Courses in Japanese (JPN)

Lower Division Courses

1. Elementary Japanese (5)
Lecture/discussion—5 hours. Introduction to spoken and written Japanese in cultural contexts, with emphasis on communication. (Students who have successfully completed Japanese 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)—I. (I.)

1A. Accelerated Intensive Elementary Japanese (15)
Lecture/discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2 and 3. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. Not open for credit to students who have completed course 1, 2, or 3.

1AS. Intensive Elementary Japanese (15)
Lecture/discussion—15 hours. Intensive course taught combining the work of courses 1, 2, and 3. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. Offered in Japan. Not open for credit to students who have taken course 1, 2, or 3.—IV. (IV.)

2. Elementary Japanese (5)
Lecture/discussion—5 hours. Prerequisite: course 1 or the equivalent. Continuation of training in basic spoken and written skills.—II. (II.)

3. Elementary Japanese (5)
Lecture/discussion—5 hours. Prerequisite: course 2 or the equivalent. Continuation of training in basic spoken and written skills.—III. (III.)

4. Intermediate Japanese (5)
Lecture/discussion—5 hours. Prerequisite: course 3 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 3.—I. (I.)

5. Intermediate Japanese (5)
Lecture/discussion—5 hours. Prerequisite: course 4 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 4.—II. (II.)

6. Intermediate Japanese (5)
Lecture/discussion—5 hours. Prerequisite: successful completion (C– or better) of course 5 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context, based on language skills developed in course 5.—III. (III.)

7S. Intensive Intermediate Japanese (20)
Lecture/discussion—20 hours. Prerequisite: course 2. Special intensive course that combines the work of courses 3, 4, 5, and 6. Introduction to Japanese grammar and development of all language skills in a cultural context with emphasis on communication. Taught in Japan. Not open for students who have taken course 3, 4, 5, or 6.—III.

10. Masterworks of Japanese Literature (in English) (4)
Lecture—3 hours; discussion—1 hour. An introduction to Japanese literature: readings and discussion in English of important works from earliest times to the present. GE credit: ArtHum, Div, Wrt.—III. (III.)

15S. Introduction to Japanese Culture (2)
Lecture/discussion—1.5 hours; term paper. Aspects of Japanese culture: literature, history, religion, art, language, and society. Conducted in English; taught in Japan.—III.

25. Japanese Language and Culture (in English) (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Linguistics 1 or Anthropology 4 recommended. Classification and communication of experience in Japanese culture; principles of language use in Japanese society. Speech levels and honorific language, language and gender, minority languages, literacy. Role of Japanese in artificial intelligence and computer science. Offered in alternate years.—I. (I.)

50. Introduction to the Literature of China and Japan (3)
Lecture—3 hours. Methods of literary analysis and their application to major works from the various genres of Chinese and Japanese literature (in translation), including film. East Asian cultural traditions will also be introduced. (Same course as Chinese 50.) GE credit: ArtHum, Div, Wrt.—II. (II.)

98. Directed Group Study (1-5)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

101. Japanese Literature in Translation: The Early Period (4)
Lecture—3 hours; discussion—1 hour. Early Japanese literature from the Nara to the end of the Heian period through a broad survey of the major literary genres such as lyric poetry, court diaries, prose narratives, poem-tales, and classical Chinese writings. GE credit: ArtHum, Div, Wrt.—I. (I.) Gundry

102. Japanese Literature in Translation: The Middle Period (4)
Lecture—3 hours; discussion—1 hour. The major literary genres from the twelfth century to the second half of the nineteenth century including poetry, renga, military chronicles, no drama, Buddhist literature, haiku, haibun, kabuki, bunraku, plays and Edo prose narratives. GE credit: ArtHum, Div, Wrt.—II. (II.) Sorensen

103. Japanese Literature in Translation: The Modern Period (4)
Lecture—3 hours; discussion—1 hour. Modern Japanese literature from the 1870s to the 1970s. Surveys representative literary works and ideas against the social and intellectual background of the Meiji, Taisho, and Showa periods. GE credit: ArtHum, Div, Wrt.—III. (III.) Chang

104. Modern Japanese Literature: War and Revolution (3)
Lecture/discussion—3 hours. Perspectives and sensibilities with which major modern Japanese writers have interpreted the traumatic and often poignant experiences of war and socio-political upheavals from the late nineteenth century to the 1970s. Lectures, discussions, and readings in English. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—I. Chang

105. Modern Japanese Literature: Hero and Anti-hero (4)
Lecture/discussion—4 hours. The ways in which representative hero and anti-hero protagonists in modern Japanese literature perceive, confront, challenge, and resolve a wide array of social, political, and moral problems of their times. Course taught in English. GE credit: ArtHum, Div, Wrt.—I. (I.) Chang

106. Japanese Culture Through Film (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Aspects of Japanese culture such as love, the family, position of women, growing up, death, and the supernatural as portrayed in films by Kurosawa, Mizoguchi, Ichikawa, Ozu, and Itami. Lectures, discussion, and readings in English. Films with English subtitles. GE credit: ArtHum, Div, Wrt.—II. (II.) Chang, Gundry, Sorensen

107. Modern Japanese Autobiographies (in English) (4)
Lecture—3 hours; term paper/discussion—1 hour. Prerequisite: upper division standing. Exploring the modern and contemporary Japanese social and cultural landscape through critical analysis of modern Japanese autobiographies by prominent and other authors in the 19th and 20th centuries. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—I. Chang

108. Poetry of China and Japan (in English) (4)
Lecture—3 hours; discussion—1 hour. A comparative approach to Chinese and Japanese poetry, examining poetic practice in the two cultures; includes a general outline of the two traditions, plus study of poetic forms, techniques, and distinct treatments of universal themes: love, nature, war, etc. Offered in alternate years. (Same course as Chinese 108.) GE credit: ArtHum, Div, Wrt.—I, II. Gundry

109. Japanese Popular Culture (5)
Lecture—3 hours; discussion—1 hour; film viewing—3 hours. Japanese popular culture, from its medieval/early modern precedents to contemporary incarnations. Emphasis on the major forms of twentieth-century popular culture, including genre films, popular theater, TV manga (cartoons), animation and science fiction. GE credit: ArtHum, Div.—III. Sorensen

111. Modern Japanese: Reading and Discussion (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6. Readings in modern Japanese short stories, newspaper articles, and essays; conversation practice based on these readings.—I. (I.)

112. Modern Japanese: Reading and Discussion (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 111. Continuation of course 111.—II. (II.)

113. Modern Japanese: Reading and Discussion (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 112. Continuation of course 112.—III. (III.)

114A. Spoken Japanese (2)
Discussion—2 hours. Prerequisite: course 6 or the equivalent. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.)—I. (I.)

114B. Spoken Japanese (2)
Discussion—2 hours. Prerequisite: course 114A or consent of instructor. Continuation of course 114A. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.)—II. (II.)

114C. Spoken Japanese (2)
Discussion—2 hours. Prerequisite: course 114B or consent of instructor. Continuation of course 114B. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.)—III. (III.)

115. Japanese Composition (2)
Lecture—2 hours. Prerequisite: course 6 or consent of instructor. Development of skills in the techniques of writing Japanese. Practice in short essay writing with an aim toward mastery of the vocabulary and syntax of written style Japanese.—I. (I.)

117S. Intensive Modern Japanese: Reading and Discussion (17)
Lecture/discussion—17 hours. Prerequisite: course 5. Intensive course taught combining the work of courses 1, 2 and 3. Intensive course combining the work of courses 6, 111, 112, and 113. Completes introduction to basic Japanese grammar. Develops more advanced reading, writing, and conversation skills in a cultural context. Taught in Japan. Not open to students who have taken courses 6, 111, 112, or 113.—III. (III.)

131. Readings in Modern Japanese Literature: 1920-1945 (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Fourth-year level reading of representative works of modern Japanese literature including short stories, novellas, diaries, memoirs, poetry and excerpts from novels and plays from 1920 through the militaristic era, to the end of the war years in 1945.—III. (III.) Chang

132. Readings in Modern Japanese Literature: 1945-1970 (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Continuation of course 131, but may be taken independently. Covers selected texts from the immediate post-war years beginning in 1945 down to 1970 and the post-war recovery.—III. (III.) Chang

133. Readings in Modern Japanese Literature: 1970 to Present (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Continuation of course 132, but may be taken independently. Covers selected texts from 1970 to the present. Offered in alternate years.—II. Chang

134. Readings in the Humanities: Traditional Culture (4)
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 113. Fourth-year level reading of modern works by major specialists on traditional Japanese culture: history, religion, thought, art, international relations, and literary history and criticism. Focus is equally on developing reading skills and learning about Japanese culture.—II. (II.) Gundry, Sorensen

135. Readings in the Humanities: The Modern Period (4)
Lecture—3 hours; term paper. Prerequisite: course 113. Fourth-year level reading of authentic modern writings on Japanese culture, history, philosophy, society, religion, law, politics, international relations, aesthetics, and comparative culture by prominent critics, commentators, and scholars.—III. (III.) Chang

136. Readings in Newspapers and Magazines (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or the equivalent. Fourth-year level reading of newspaper and magazine reports, articles,

and editorials on domestic and international affairs relating to contemporary Japan. Offered in alternate years.—(I.)

141. Introduction to Classical Japanese (4)
Lecture/discussion—4 hours. Prerequisite: one advanced Japanese reading course such as Japanese 131, 132, or the equivalent reading knowledge of Japanese. The basic features of classical Japanese grammar through careful reading of selected literary texts such as Hojoki or Tsurezuregusa. Offered in alternate years.—III.

151. Japanese Linguistics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1, 2, and 3 or equivalent. Introduction to Japanese linguistics, featuring key aspects of the Japanese language. Analysis of Japanese from the perspectives of phonology, syntax, discourse analysis, sociolinguistics and psycholinguistics. GE Credit: ArtHum, Div, Wrt.—I. (I.)

152. Traditional Japanese Drama (4)
Lecture—3 hours; discussion—1 hour. Survey in English of Japanese drama, focusing on traditional forms: noh, kyôgen, bunraku puppet theater, and kabuki, with some attention to modern theater. Texts of plays and secondary works on performance techniques and the composition of plays. GE Credit: ArtHum, Div, Wrt.—(III.) Sorensen

156. Japanese Literature on Film (4)
Lecture—3 hours; discussion—1 hour. Survey of films based on works of Japanese literature, emphasis on pre-modern and early modern texts. Introduction to major directors of Japan, with a focus on cinematic adaptation. Lectures and readings in English. Films in Japanese with English subtitles. Offered in alternate years. GE Credit: ArtHum, Div, Wrt.—(III.) Sorensen

192. Japanese Internship (1-12)
Internship—3-36 hours to be arranged. Prerequisite: upper division standing and consent of instructor. Work experience in Japanese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.)

197T. Tutoring in Japanese (1-5)
Tutoring—1-5 hours. Prerequisite: consent of Department chairperson. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit, but only 2 units may be applied to the minor. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

291. Seminar in Modern Japanese Literature: Major Writers (4)
Seminar—4 hours. Prerequisite: any one of courses 131, 132, 133, 134, 135, or the equivalent. In-depth reading and critical analyses of major works by and critical literature on one or two prominent modern or contemporary writers such as Natsume Soseki, Mori Ogai, Shimazaki Toson, Akutagawa Ryunosuke, Tanizaki Junichiro, Abe Kobo and Oe Kenzaburo. Offered in alternate years.—III. Chang

299. Research (1-12)
(S/U grading only.)

East Asian Studies

(College of Letters and Science)

Chia-ning Chang, Ph.D., Program Director

Program Office. 177 Kerr Hall
(530) 752-4001; *http://eastasian.ucdavis.edu*

Committee in Charge

Katharine Burnett, Ph.D., Associate Professor *(Art History)*
Chia-ning Chang, Ph.D., Professor *(East Asian Studies)*
Mark Halperin, Ph.D., Associate Professor *(East Asian Languages and Cultures)*
Kyu Hyun Kim, Ph.D., Associate Professor *(History)*
Sheldon Lu, Ph.D., Professor *(Comparative Literature)*
Ethan Scheiner, Ph.D., Associate Professor *(Political Science)*
Eddy U, Ph.D., Assistant Professor *(Sociology)*

The Major Program

The East Asian Studies major gives the student an understanding of East Asia (especially China and Japan) through interdisciplinary studies that combine sustained work in an East Asian language with courses on East Asian countries.

The Program. The program offers core courses in East Asian history, humanities, social sciences, and languages. After taking the core courses in conjunction with two years or more of either Chinese or Japanese language study, the student chooses additional courses focusing on a special field of interest, such as anthropology or history. Since six quarters of language work are required, students normally should apply to the East Asian studies program no later than their sophomore year.

Programs, Internships, and Career Alternatives. One program of interest to East Asian Studies majors is the education abroad program, which gives students the opportunity to live and experience the culture of their focus country. At UC Davis, the Internship and Career Center helps students obtain legislative, legal, and business internships. Additionally, the UC Davis Washington Center arranges internships and runs a full-credit academic program in Washington D.C. with a full range of opportunities for East Asian Studies majors. East Asian Studies graduates are prepared for employment in government agencies (such as Foreign Service), state agencies, international or non-governmental (such as United Nations), foundations, journalism, teaching, counseling and companies having an interest in international business, trade, finance. The stringent language requirement of the major program enhances career prospects in jobs that demand knowledge of language and culture of the focus country.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter.....41-42
History 9A and 9B..... 8
One course from Art History 1D, Chinese 10, 11, Comparative Literature 53A, Japanese 10, 25, Religious Studies 70, 75.....3-4
Two years (or the equivalent) of Chinese or Japanese language study (Chinese 1-2-3-4-5-6; Japanese 1-2-3-4-5-6)..... 30

Depth Subject Matter 36
Must include at least 8 units of core courses from each of the following three categories.
History:
History 191A, 191B, 191C, 191D, 191E, 191F; 194A-194B or 194B-194C
Social Science:
Anthropology 148A, 148B, 149A, 149B; Economics 171; Geography 127; Political Science 148A, 148B; Sociology 147
Humanities:
Art History 163A, 163B, 163C, 164; Chinese 104, 106, 107, 109, 131, 132; Japanese 101, 102, 103; Religious Studies 172
At least 12 additional units must be selected from the above courses, or from the following:
Anthropology 110, 112, 117, 119, 120, 122, 123, 124, 128; Chinese (any upper division course); Economics 115A, 115B, 116, 160A, 160B, 162; Geography 143; History 102G, 102H, 102N; Japanese (any upper division course); Linguistics 100; Political Science 127, 133, 138, 145, 148C; Sociology 118, 141, 170, 183 (or other appropriate courses, including individual and group study courses (198, 199), as approved by the Committee in charge).

Total Units for the Major 77-78

Recommended

Students are strongly urged to take a substantial number of courses in Euro-American civilization as a basis for comparison for a deeper understanding of America's relations with East Asia.

Major Adviser. Chia-ning Chang *(East Asian Studies)*, Mark Halperin *(East Asian Languages and Cultures)*

Minor Program Requirements:

Courses taken for the minor are expected to reflect a predominant interest in either China or Japan, but also to provide some exposure to the other of the two countries. All courses counting towards the East Asian Studies major, including individual and group study courses (198, 199), may be used to fulfill the requirements for the minor program, as long as they deal predominantly with China, Japan, or both.

UNITS

East Asian Studies.....22
History 9B and 18 upper division units, of which at least 12 must be in courses focusing on China; OR History 9A and 18 upper division units, of which at least 12 must be in courses focusing on Japan 22

Courses in East Asian Studies. The following courses count toward the major and are open to students throughout the campus. See departmental listings for course descriptions.

Anthropology

148A.	Culture and Political Economy in Contemporary China
149B.	Contemporary Japanese Society

Art History

1D.	Asian Art
163A.	Chinese Art
163B.	Chinese Painting
163C.	Painting in the People's Republic of China
164.	The Arts of Japan

Chinese

All courses

Comparative Literature

53A.	Literature of China and Japan
153.	The Forms of Asian Literature

Economics

171.	Economy of East Asia

History

9A.	History of East Asian Civilization (China)
9B.	History of East Asian Civilization (Japan)
102G.	Undergraduate Proseminar: China to 1800
102H.	Undergraduate Proseminar: China since 1800
102N.	Undergraduate Proseminar: Japan
191A.	Classical China
191B.	High Imperial China
191C.	Late Imperial China
191D.	Nineteenth-Century China
191E.	The Chinese Revolution

191F. History of the People's Republic of China, 1949 to the Present
194A. Aristocratic and Feudal Japan through 16th Centuries
194B. Early Modern Japan, 17th-19th Centuries
194C. Modern Japan 20th Centuries
194D. Business and Labor in Modern Japan
194E. Education and Technology in Modern Japan
195B. History of Modern Korea

Japanese

All courses.

Political Science

148A. Government and Politics in East Asia: China
148B. Government and Politics in East Asia: Pacific Rim
148C. Government and Politics in East Asia: Southeast Asia

Religious Studies

75. Chinese Philosophy: An Introduction
170. Introduction to Buddhism
172. Ch'an (Zen) Buddhism

Sociology

147. Sociological Perspectives on East Asia
188. Social Stratification in China

Courses in East Asian Studies (EAS)

Lower Division Course

88. Korean Society: Late 19th Century to the Present (4)

Lecture/discussion—4 hours. Modern Korean society (late 19th Century to contemporary period), emphasizing the perseverance and transformations of traditional social and cultural patterns. GE credit: ArtHum, Div, Wrt.—II. Kim

Upper Division Courses

113. Cinema and Society in China (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: one course from History 190C, 193, or consent of instructor. Knowledge of Chinese not required. Viewing and analysis of one Chinese film with English subtitles each week, followed by discussion and short essays. Cinematic technique, social values and film topics from 1930s to today. Not open for credit to students who have completed Chinese 113. GE credit: ArtHum, Div, Wrt.—III. (III.)

190. East Asian Studies Seminar (4)

Seminar—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Political, social, cultural, and economic issues in East Asia. Topic varies each year. May be repeated for credit if topic differs. Not offered every year.

192. East Asian Studies Internship (1-12)

Internship—3-36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Work experience in the East Asian Studies field, with analytical term paper on a topic approved by the instructor. (P/NP grading only.)

194H. Special Study for Honors Students (1-5)

Independent study—1-5 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in East Asian Studies culture, society, or language. (P/NP grading only.)

196A-196B. Honors Seminar (4-4)

Seminar—2 hours; conference—2 hours. Prerequisite: a GPA of 3.500 in the major, senior standing, and consent of instructor. A two-quarter research project culminating in an Honors thesis. A grade of B or higher must be earned to qualify the student for honors distinction at graduation. (Deferred grading only, pending completion of sequence.)

198. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

Ecological Management and Restoration

(College of Agricultural and Environmental Sciences)

Faculty. See Plant Sciences, on page 461.

The Major Program

This major is designed for students who are interested in understanding how to manage and restore wildland and rangeland plant communities. Courses are selected to provide an interdisciplinary background that encompasses ecology, applied plant biology, and the social sciences. Students will acquire a core understanding of natural and managed ecosystems and how they function, interact with the natural environment, are connected with human society and social change, and are restored and managed.

The Program. The curriculum provides depth in the ecological and botanical sciences directed toward an integrated understanding of how communities and ecosystems function and how this knowledge can assist in their management and restoration. Courses in environmental policy and law expose the students to the social drivers and constraints of ecosystem management. All students gain practical experience through practical field courses and a required internship. Students may also pursue an Honors thesis in their senior year.

Career Alternatives. Graduates from this program are prepared to pursue a wide range of careers, including positions in ecological restoration and ecosystem management; rangeland and reserve management; environmental consulting; public, private, or non-profit agencies concerned with restoration and natural resource management; Cooperative Extension; teaching; information and communication services. Graduates are qualified to pursue advanced studies in fields such as ecology, agroecology, environmental studies, geography or weed science.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 51-61

Biological Sciences 1A, 1B, 1C or 2A, 2B, 2C 14-15
Chemistry 2A, 2B 10
Physics 1A, 1B or Physics 7A, 7B, 7C 6-12
Mathematics 16A, 16B or Mathematics 17A, 17B or Mathematics 21A, 21B..... 6-8
Plant Sciences 21..... 3
Plant Sciences 120..... 4
Soil Science 100..... 5
Plant Sciences 101 or Environmental Science and Policy 1 3-4

Depth Subject Matter 60-80

Environmental Horticulture 160, 160L..... 4
Plant Sciences146 or Soil Science 105 or 111 or 112 or 118..... 3-5
Two courses chosen from Environmental Science and Policy 155, Plant Biology 117, 147, Plant Sciences 131, 144, Wildlife, Fish, and Conservation Biology 156, 157..... 6-8
Evolution and Ecology 100 or Plant Biology 102 or 108 or 116 4-5
Plant Sciences 152 or Environmental Horticulture 150..... 3-4
Three courses chosen from Plant Sciences 130, 135, 150, Environmental Science and Policy 127, 155L, Wildlife, Fish, and Conservation Biology 154, 155 8-10
Plant Sciences 176 4
Environmental Science and Management 100, Geology 35, Hydrology 143, 147, or 151 3-4
Plant Sciences 171 or Environmental Horticulture 120 3-4
Plant Sciences 100C or one from each of these two lists: 3-9
  Plant Sciences 158 or Soil Science 109; Hydrology 110 or 124
Environmental Science and Management 141 4
Plant Sciences 135 or 141 or 162 or Entomology 107 or Soil Science 112 or other course chosen in consultation with an advisor 3-5
Landscape Architecture 180F or Plant Sciences 163 3
Environmental Horticulture 102 or Plant Biology 111 or Plant Sciences157 or 158 4
Environmental Science and Policy 160 or 161 or 171 or 172 or 179 and 179L 3-5
Internship; Plant Sciences 192..... 2

Total Units for the Major 111-141

Major Adviser. T. P. Young

Advising Center for the major, including peer advising, is located in 1220 Plant and Environmental Sciences (530) 752-1715.

Ecology (A Graduate Group)

S.P. Lawler, Ph.D., Chairperson of the Group

Group Office. 1005 Wickson Hall
(530) 752-6752; *http://ecology.ucdavis.edu*

Faculty

Marissa L. Baskett, Ph.D., Assistant Professor *(Environmental Science and Policy)*
Alison M. Berry, Ph.D., Professor *(Plant Sciences)*
Robert L. Bettinger, Ph.D., Professor *(Anthropology)*
Monique Borgerhoff Mulder, Ph.D., Professor *(Anthropology)*
Louis W. Botsford, Ph.D., Professor *(Wildlife, Fish, and Conservation Biology)*
Walter M. Boyce, Ph.D., Professor *(Pathology, Microbiology, and Immunology)*
Patrick H. Brown, Ph.D. Professor *(Plant Sciences)*
Mary Cadenasso, Ph.D., Associate Professor *(Plant Sciences)*
James Carey, Ph.D., Professor *(Entomology)*
Tim Caro, Ph.D., Professor *(Wildlife, Fish, and Conservation Biology)*
Edward P. Caswell-Chen, Ph.D., Professor *(Nematology)*
Ernest S. Chang, Ph.D., Professor *(Bodega Marine Laboratory)*
Howard V. Cornell, Ph.D., Professor *(Environmental Science and Policy*
Randy A. Dahlgren, Ph.D., Professor *(Land, Air and Water Resources) Academic Senate Distinguished Teaching Award*
Christyann M. Darwent, Ph.D., Associate Professor *(Anthropology)*
Serge I. Doroshov, Ph.D., Professor *(Animal Science)*
John M. Eadie, Ph.D., Professor *(Wildlife, Fish, and Conservation Biology)*
Deborah L. Elliott-Fisk, Ph.D., Senior Lecturer *(Wildlife, Fish, and Conservation Biology)*
Holly Ernest, D.V.M., Ph.D. *(VM: Population Health and Reproduction)*
Valerie. T. Eviner, Ph.D., Assistant Professor *(Plant Sciences)*
Nann A. Fangue, Ph.D., Assistant Professor *(Wildlife, Fish Conservation Biology)*
Y. Hossein Farzin, Ph.D., Professor *(Agricultural and Resource Economics)*

Howard Ferris, Ph.D., Professor *(Nematology)*
Albert Fischer, Ph.D., Associate Professor *(Plant Sciences)*
Janet E. Foley, Ph.D., Associate Professor *(VM: Epidemiology)*
Brian Gaylord, Ph.D., Associate Professor *(Evolution and Ecology)*
Shu Geng, Ph.D., Professor *(Plant Sciences)*
Paul Gepts, Ph.D., Professor *(Plant Sciences)*
Steven E. Greco, Ph.D., Associate Professor *(Environmental Design)*
Susan L. Handy, Ph.D., Professor *(Environmental Science and Policy)*
Alexander H. Harcourt, Ph.D., Professor *(Anthropology)*
Susan Harrison, Ph.D., Professor *(Environmental Science and Policy)*
Alan Hastings, Ph.D., Professor *(Environmental Science and Policy)*
Robert Hijmans, Ph.D., Assistant Professor *(Environmental Science and Policy)*
Tessa Hill, Ph.D., Assistant Professor *(Geology)*
Marcel Holyoak, Ph.D., Professor *(Environmental Science and Policy)*
William Horwath, Ph.D., Professor *(Land, Air and Water Resources)*
Benjamin Z. Houlton, Ph.D., Assistant Professor *(Land, Air and Water Resources)*
Silas S. O. Hung, Ph.D., Professor *(Animal Science)*
Louise E. Jackson, Ph.D., Professor *(Land, Air and Water Resources)*
Marie A. Jasieniuk, Ph.D., Associate Professor *(Plant Sciences)*
Richard Karban, Ph.D., Professor *(Entomology)*
Douglas A. Kelt, Ph.D., Professor *(Wildlife, Fish, and Conservation Biology)*
Christine Krueder Johnson, Ph.D., Assistant Professor *(VM: Wildlife Health Center)*
Dietmar Kueltz, Ph.D., Professor *(Animal Science)*
Emilio A. Laca, Ph.D., Professor *(Plant Sciences)*
John Largier, Ph.D., Professor *(Environmental Science and Policy)*
Andrew M. Latimer, Ph.D., Assistant Professor *(Plant Sciences)*
Sharon P. Lawler, Ph.D., Professor *(Entomology)*
Edwin E. Lewis, Ph.D., Associate Professor *(Entomology and Nematology)*
C. -Y. Cynthia Lin, Ph.D. Assistant Professor *(Agricultural and Resource Economics, Environmental Science and Policy)*
Mark Lubell, Ph.D., Associate Professor *Environmental Science and Policy)*
Andrew Marshall, Ph.D., Assistant Professor *(Anthropology)*
Richard L. McElreath, Ph.D. Associate Professor *(Anthropology)*
Frank M. Mitloehner, Ph.D., Associate Professor *(Animal Science)*
Steven G. Morgan, Ph.D., Professor *(Environmental Science and Policy, Bodega Marine Laboratory)*
Peter B. Moyle, Ph.D., Professor *(Wildlife, Fish, and Conservation Biology)*
Steven A. Nadler, Ph.D., Professor *(Nematology)*
Gabrielle Nevitt, Ph.D., Professor *(Neurobiology, Physiology, Behavior)*
Debbie A. Niemeier, Ph.D., Professor *(Civil and Environmental Engineering)*
Benjamin S. Orlove, Ph.D., Professor *(Environmental Science and Policy)*
Gregory Pasternack, Ph.D., Professor *(Land, Air and Water Resources)*
Gail L. Patricelli, Ph.D., Assistant Professor *(Evolution and Ecology)*
Kyaw Tha Paw U, Ph.D., Professor *(Land, Air and Water Resources)*
Dan Potter, Ph.D., Professor *(Plant Sciences)*
James F. Quinn, Ph.D., Professor *(Environmental Science and Policy)*
Marcel Rejmanek, Ph.D., Professor *(Evolution and Ecology)*
Eliska Rejmankova, Ph.D., Professor *(Environmental Science and Policy)*
Kevin J. Rice, Ph.D., Professor *(Plant Sciences)*
James H. Richards, Ph.D., Professor *(Land, Air and Water Resources)*
David Rizzo, Ph.D., Professor *(Plant Pathology)*
Jay A. Rosenheim, Ph.D., Professor *(Entomology)*
James N. Sanchirico, Ph.D., Associate Professor *(Environmental Science and Policy)*
Eric D. Sanford, Ph.D., Assistant Professor *(Evolution and Ecology)*
Thomas W. Schoener, Ph.D., Professor *(Evolution and Ecology)*
Sebastian Schreiber, Ph.D. Professor *(Evolution and Ecology)*
Mark W. Schwartz, Ph.D., Professor *(Environmental Science and Policy) Academic Senate Distinguished Teaching Award*
S.G. Schladow, Ph.D., Professor *(Civil and Environmental Engineering)*
Kate M. Scow, Ph.D., Professor *(Land, Air and Water Resources)*
H. Bradley Shaffer, Ph.D., Professor *(Evolution and Ecology)*
Arthur M. Shapiro, Ph.D., Distinguished Professor *(Evolution and Ecology)*
Andrew Sih, Ph.D., Professor *(Environmental Science and Policy)*
Johan Six, Ph.D., Professor *(Plant Sciences)*
David R. Smart, Ph.D., Associate Professor *(Viticulture and Enology)*
Michael R. Springborn, Ph.D., Assistant Professor *(Environmental Science and Policy)*
Jay Stachowicz, Ph.D., Professor *(Evolution and Ecology)*
Maureen Stanton, Ph.D. Professor *(Evolution and Ecology)*
Sharon Y. Strauss, Ph.D., Professor *(Evolution and Ecology)*
Donald Strong, Ph.D., Professor *(Evolution and Ecology)*
Ron Tjeerdema, Ph.D., Professor *(Environmental Toxicology)*
Brian Todd, Ph.D. Assistant Professor *(Wildlife, Fish Conservation Biology)*
Thomas P. Tomich, Ph.D., Professor *(Environmental Science and Policy, Human and Community Development)*
Susan L. Ustin, Ph.D., Professor *(Land, Air and Water Resources)*
Chris Van Kessel, Ph.D., Professor *(Plant Sciences)*
Dirk Van Vuren, Ph.D., Professor *(Wildlife, Fish, and Conservation Biology)*
Peter C. Wainwright, Ph.D., Professor *(Evolution and Ecology) Academic Senate Distinguished Teaching Award*
Neal M. Williams, Ph.D., Assistant Professor *(Entomology)*
Susan L. Williams, Ph.D., Professor *(Evolution and Ecology)*
John C. Wingfield, Ph.D., Professor *(Neurobiology, Physiology and Behavior*
Bruce Winterhalder, Ph.D. Professor *(Anthropology)*
Truman P. Young, Ph.D., Professor *(Plant Sciences)*
Louie H. Yang, Ph.D., Assistant Professor *(Entomology)*

Affiliated Faculty

William Bennett, Ph.D., Assistant Researcher Ecologist *(John Muir Institute of the Environment)*
Richard Y. Evans, Ph.D., Extension Specialist *(Plant Sciences)*
Edwin DeHaven Grosholz, Ph.D., Cooperative Extension Specialist *(Environmental Science and Policy)*
Michael L. Johnson, Ph.D., Associate Director *(Center for Watershed Sciences)*
Peter Klimley, Ph.D., Associate Research Biologist *(Bodega Marine Laboratory)*
Bernie May, Ph.D., Adjunct Professor *(Animal Science)*
A. Keith Miles, Ph.D., Research Biologist *(Wildlife, Fish, and Conservation Biology)*
Malcolm North, Ph.D., Research Associate *(Plant Sciences)*
Ben Sacks, Ph.D., Adjunct Assistant Professor *(VM: Population Health and Reproduction)*
Kenneth W. Tate, Ph.D., Cooperative Extension Specialist *(Plant Sciences)*
Swee Teh, Ph.D., Research Toxicologist/Pathologist *(Anatomy, Physiology and Cell Biology)*
Lisa C. Thompson, Ph.D., Associate Specialist in Cooperative Extension *(Wildlife, Fish, and Conservation Biology)*
Inge Werner, Ph.D., Associate Adjunct Professor *(Anatomy, Physiology and Cell Biology)*
Minghua Zhang, Ph.D., Associate Adjunct Professor *(Land, Air and Water Resources)*

Graduate Study. The Graduate Group in Ecology offers the M.S. and Ph.D. degrees. Ecology is a science that integrates numerous fields of study to attain deep understanding of natural and societal influences on the distribution, abundances, behaviors, traits, and ecosystem functions of organisms. In order to accommodate varied student interests, the Group has developed several 'areas of emphasis' with specialized programs of study: agricultural ecology, conservation ecology, ecosystems and landscape ecology, ecotoxicology, environmental policy and human ecology, integrative ecology, marine ecology, physiological ecology and restoration ecology. For further details, contact the Group office.

Preparation. Appropriate preparation is undergraduate work in any of the biological, social or behavioral, and physical sciences, mathematics or engineering. Applicants will normally be expected to have completed the following courses during the undergraduate years or shortly after matriculating: two courses each in introductory biology, general chemistry and physical science; one course each in calculus, an upper division introduction to ecology course and introductory statistics. Students that choose the environmental policy and human ecology area of emphasis are only required to complete one course in general chemistry. They may also substitute one quantitative course in social science such as micro- or macro-economics for one chemistry or physics requirement.

Graduate Advisers. S. Lawler, E. Grosholz. E. Lewis *(Ecosystems and Landscape Ecology)*, P. Moyle *(Conservation Ecology)*, E. Rejmankova *(Conservation Ecology)*, K. Rice *(Restoration Ecology)*, J. Richards *(Integrative and Physiological Ecology)*, E. Sanford *(Marine Ecology)*, A. Shapiro *(Conservation Ecology)*, J. Six *(Agricultural Ecology)*, R. Tjeerdema *(Ecotoxicology)*

Courses in Ecology (ECL)

Graduate Courses

200A. Principles and Applications of Ecology (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: first course in Ecology (e.g., Environmental Science and Policy 100), Statistics 102, Mathematics 16A, 16B or consent of instructor; pass 1 open to graduate majors. Provides a broad background in the principles and applications of ecology, and serves as a foundation for advanced ecology courses. Topics include ecophysiology, behavioral ecology, population ecology, genetics and evolution. Emphasis on historical developments, current understanding, and real world applications.—I. (I.) Holyoak, Rice

200B. Principles and Applications of Ecology (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A; pass 1 open to graduate majors. Principles and applications of ecology, continuing topical coverage from ECL200A. The course covers principles of community structure and functioning, species diversity patterns, ecosystem ecology and biogeochemistry, landscape ecology, biogeography and phylogenetics.—II. (II.) Cornell

201. Ecosystems and Landscape Ecology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A and 200B. Overview of ecosystem and landscape principles (structure, energy, nutrient flow, species diversity, landscape heterogeneity, change and stability), building on ecological principles and theory. Introduction to analysis tools

(remote sensing, geographic information systems, modeling) applied to landscape systems. Offered in alternate years.—(II.) Cadenasso, Eviner

203. Physiological Ecology (3)
Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Studies 100; Neurobiology, Physiology, and Behavior 110 or Plant Biology 111 or Environmental Studies 129; elementary calculus. A comparative examination of several animal groups addressing fundamental physiological mechanisms that shape the ecology of each animal group. Offered in alternate years—III. Wainwright

204. Population and Community Ecology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100 or Evolution and Ecology 101, Mathematics 21A-21B or consent of instructor; Mathematics 22B recommended. Review of major concepts of population ecology and community ecology, with emphasis on the rationale of theory and use of theory as applied in the ecology of natural and managed systems. Offered in alternate years.

205. Community Ecology (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: Environmental Studies 100, Evolution and Ecology 101, or Plant Biology 117. Introduction to literature and contemporary research into processes structuring ecological communities.—(II.) Karban, Lawler

206. Concepts and Methods in Plant Community Ecology (4)
Lecture—3 hours; laboratory—4 hours. Prerequisite: introductory courses in statistics and plant ecology; consent of instructor. Principles and techniques of vegetation analysis, including structure, composition, and dynamics. Emphasis given to sampling procedures, association analysis, ordination, processes and mechanisms of succession, and classification. Most techniques are demonstrated or conducted during field trips and laboratories. Offered in alternate years.—I. (I.) Rejmanek

207. Plant Population Biology (3)
Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Science and Policy 100, Evolution and Ecology 101, Entomology 104 or Plant Biology 117), and advanced undergraduate course in genetics and/or evolution (e.g., Biological Sciences 101 or Evolution and Ecology 100). Introduction to theoretical and empirical research in plant population biology. Emphasis placed on linking ecological and genetic approaches to plant population biology. (Same course as Population Biology 207.) Offered in alternate years.—(II.) Rice

208. Issues in Conservation Biology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one of Environmental Studies 100, Zoology 125, Botany 117, or Entomology 106. Graduate-level introduction to current research in conservation biology. Course will emphasize reading and discussing primary literature. Specific topics will reflect the research interests of UC Davis conservation biology faculty.—II. (II.) Harrison

211. Advanced Topics in Cultural Ecology (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Environmental Science and Policy 133/Anthropology 133 and graduate standing in Ecology or Anthropology. Topics of current analytical and methodological importance in cultural ecology. Examination of general issues in cultural ecology through study of human response to and influences on climate. (Same course as Anthropology 211.) Offered in alternate years.—(I.) Orlove

212A. Environmental Policy Process (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course in public policy (e.g., Environmental Studies 160) or environmental law (e.g., Environmental Studies 161); course in bureaucratic theory (e.g., Political Science 187 or Environmental Studies 166); course in statistics (e.g., Sociology 106 or Agricultural and Resource Economics 106). Introduction to selected topics in the policy process, applications to the field of environmental policy. Develops critical reading skills, understanding of frameworks of the policy process and political behavior, and an ability to apply multiple frameworks to the same phenomena. Offered in alternate years. (Same course as Environmental Science and Policy 212A.)—III.

212B. Environmental Policy Evaluation (4)
Lecture—1 hour; discussion—1 hour; seminar—2 hours. Prerequisite: intermediate microeconomics (e.g., Economics 100); Statistics 108 or Agricultural and Resource Economics 106; policy analysis (e.g., Environmental Studies 168A or the equivalent); Agricultural and Resource Economics 176. Methods and practices of policy analysis; philosophical and intellectual bases of policy analysis and the political role of policy analysis. (Same course as Environmental Science and Policy 212B.) Offered in alternate years.—II. Springborn

213. Population, Environment, and Social Structure (4)
Seminar—3 hours; term paper. Prerequisite: at least one course in population or human ecology, or in environment and resources. Relationships among population dynamics, resource scarcity and environmental problems, and social structure; focus on demographic content of global ecological models and simulations, ecological content of modern demographic theories, and debates about scarcity, inequality, and social conflict and change. Offered in alternate years.—III.

214. Marine Ecology: Concepts and Practice (3)
Lecture—1 hour; discussion—1.5 hours; fieldwork—1.5 hours. Prerequisite: graduate standing or one course in ecology, one course in evolution or genetics, consent of instructor; survey course in marine ecology recommended. Critical review and analysis of concepts and practices in modern marine ecology at the interface of several fields of study including oceanography, evolution, behavior, and physiology. Emphasis on critical thinking, problem solving, and hands-on study. Three field trips required. Offered in alternate years.—III. Morgan

216. Ecology and Agriculture (3)
Lecture—3 hours. Prerequisite: Plant Biology 142 or consent of instructor. Ecological principles and relationships as applied to agriculture. Integration of ecological approaches into agricultural research to develop environmentally sound management practices. Topics include crop autoecology, biotic interactions among crops and pests, and crops systems ecology. Not open for credit to students who have completed Vegetable Crops 216. (Former course Vegetable Crops 216). Offered in alternate years.—I. (I.) Jackson

217. Conservation and Sustainable Development in Third World Nations (4)
Lecture/discussion—3 hours; fieldwork—2 hours. Prerequisite: at least one course from two of these three groups: (a) Environmental Studies 160, 161, 168A, 168B; (b) Environmental Studies 101, 133, International Agricultural Development 103, Geography 142; (c) Anthropology 126, 131, Geography 141, Sociology 144, 145A, 145B. Examination of the patterns of resource ownership, control and management in agricultural lands, extractive zones (fisheries, forests) and wildlands, with emphases on conservation and sustainability. Comparison of industrial democracies and poorer nations. (Same course as International Agricultural Development 217.) Offered in alternate years.—Orlove

219. Ecosystem Biogeochemistry (4)
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: introductory courses in ecology/biology and soils are recommended; undergraduates accepted with consent of instructor. Multi-disciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere, and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies. (Same course as Soil Science 219.) Offered in alternate years.—III. Dahlgren

220. Spatio-Temporal Ecology (2)
Lecture/discussion—2 hours. Prerequisite: Population Biology 200B or course 204 or Evolution and Ecology 104 or Environmental Science and Policy 121 or consent of instructor. Spatio-temporal ecological theory focusing on population persistence and stability, predator-prey and host-parasitoid interactions, species coexistence and diversity maintenance, including effects of environmental variation, spatial and temporal scale, life-history traits and nonlinear dynamics. Topics vary. (Same course as Population Biology 220.) May be repeated one time for credit. (S/U grading only.)—II.

222. Human Ecology of Agriculture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division course work in environmental sciences, cultural anthropology, economics, international agricultural development or sociology, or consent of instructor. Social and cultural factors relating to agricultural adaptation and evolution. Ethnobiological knowledge systems, rules and customs of resource allocation, impact of population growth, technological change, states and markets. Social and cultural contexts of biological diversity and agricultural resource conservation.—I. Brush

225. Terrestrial Field Ecology (4)
Seminar—1 hour; field work—12 hours. Prerequisite: introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (Same course as Entomology 225/Population Biology 225.)—III. (III.) Karban

231. Mathematical Methods in Population Biology (3)
Lecture—3 hours. Prerequisite: Mathematics 16C or 21C or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference equation and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology models are stressed. (Same course as Population Biology 231.)—I. (I.) Hastings

232. Theoretical Ecology (3)
Lecture—3 hours. Prerequisite: course 204 or the equivalent, and Mathematics 16C or 21C; or one of courses 100 or 121 or Evolution and Ecology 101, and a strong mathematics background (Mathematics 22A-22B-22C or the equivalent). Examination of major conceptual and methodological issues in theoretical ecology. Model formulation and development will be emphasized. Topics will vary from year to year. May be repeated for credit. Offered in alternate years.—(II.) Hastings

242. Ecological Genetics: Applied Genetics for Ecology, Health, and Conservation of Natural Populations (3)
Lecture—2 hours; discussion—0.5 hours; laboratory—0.5 hours. Prerequisite: undergraduate genetics and ecology/conservation biology courses recommended. Introduction to the field of applied ecological genetics to include applications in conservation ecology, population genetics, population biology, wildlife health and disease ecology. Limited enrollment. (Same course as Population Health and Reproduction 242.)—II. (II.) Ernest

280. Current Anthropology Journal Editorial Workshop (4)
Workshop—1 hour; independent study—3 hours. Students must enroll for all three quarters. Reading and offering workshop critiques of manuscripts submitted for publication, and reading and discussion of other relevant work in anthropology and human ecology. Track and edit published comments and authors' replies that accompany major features. Participation in the development of new sections for the electronic edition of the journal, including a "news and views" section and a debate section. (Same course as Anthropology 280.) May be repeated for 12 units of credit with consent of instructor. (S/U grading only.)—I, II, III. Orlove

290. Seminar in Ecology (1-4)
Seminar—1-4 hours. Prerequisite: consent of instructor. Topics in biological, human, physical, and chemical ecology. Students are expected to present an oral seminar on a particular aspect of the general topic under consideration. (S/U grading only.)—I, II, III. (I, II, III.)

296. Topics in Ecology and Evolution (1)
Seminar—1 hour. Prerequisite: graduate standing. Seminars presented by visiting lecturers, UC Davis faculty, and graduate students. May be repeated for credit. (Same course as Population Biology 292.) (S/U grading only.)—I, II, III. (I, II, III.)

297T. Tutoring in Ecology (1-4)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing in ecology; consent of instructor. Teaching ecology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
Prerequisite: graduate standing. (S/U grading only.)

Economics

(College of Letters and Science)

_____, Chairperson of the Department

_____, Vice Chairperson of the Department

Department Office. 1113 Social Sciences and Humanities Building
(530) 752-0741; *http: www.econ.ucdavis.edu*

Faculty

Paul Bergin, Ph.D., Professor
Giacomo Bonanno, Ph.D., Professor
Colin Cameron, Ph.D., Professor
Scott E. Carrell, Ph.D., Assistant Professor
Gregory Clark, Ph.D., Professor
Mitali Das, Ph.D., Associate Professor
Robert C. Feenstra, Ph.D., Professor
Athanasios Geromichalos, Ph.D., Assistant Professor
L. Jay Helms, Ph.D., Associate Professor
Hilary Hoynes, Ph.D., Professor
Oscar Jorda, Ph.D., Professor
Christopher R. Knittel, Ph.D., Associate Professor
Guido Kuersteiner, Ph.D., Associate Professor
Christopher M. Meissner, Ph.D. Associate Professor
Douglas Miller, Ph.D., Associate Professor
Marianne E. Page, Ph.D., Professor
Giovanni Peri, Ph.D., Associate Professor
Martine Quinzii, Ph.D., Professor
Dave Rapson, Ph.D., Assistant Professor
Pontus Rendahl, Ph.D., Assistant Professor
Katheryn N. Russ, Ph.D., Assistant Professor
Kevin D. Salyer, Ph.D., Professor
Burkhard C. Schipper, Ph.D., Assistant Professor
Ina Simonovska, Ph.D., Assistant Professor
Joaquim Silvestre, Ph.D., Professor
Ann Huff Stevens, Ph.D., Professor
Deborah Swenson, Ph.D., Professor
Alan M. Taylor, Ph.D., Professor
Wing T. Woo, Ph.D., Professor

Emeriti Faculty

Andrzej Brzeski, Ph.D., Professor Emeritus
W. Eric Gustafson, Ph.D., Senior Lecturer Emeritus
Academic Senate Distinguished Teaching Award
Kevin D. Hoover, D.Phil., Professor Emeritus
Hiromitsu Kaneda, Ph.D., Professor Emeritus
Peter H. Lindert, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Louis Makowski, Ph.D., Professor Emeritus
Thomas Mayer, Ph.D., Professor Emeritus
Klaus Nehring, Ph.D., Professor Emeritus
Alan L. Olmstead, Ph.D., Professor Emeritus
Steven M. Sheffrin, Ph.D., Professor Emeritus
T. Y. Shen, Professor Emeritus
Elias H. Tuma, Ph.D., Professor Emeritus
Gary M. Walton, Ph.D., Professor Emeritus
Leon L. Wegge, Ph.D., Professor Emeritus

Affiliated Faculty

Emanuel A. Frenkel, Ph.D., Lecturer
Bagher Modjtahedi, Ph.D., Lecturer

The Major Program

Economics is the study of how individuals, organizations, and societies choose among alternative uses of resources and how these resources are turned into the things people want.

The Program. Economics majors complete an introductory course sequence in economics, in addition to several courses in quantitative methods. Intermediate theory and economic history are taken on the upper division level and then students are free to concentrate the remainder of their units in various areas of interest, including more courses in economic theory or history, international economics, labor, industry, alternative economic systems, economic development, public finance, econometrics, or mathematical economics.

Internships and Career Alternatives. Internships for economics majors have been arranged at banks, brokerages, other business enterprises, and governmental units. The internships must complement the student's course work. A degree in economics is excellent preparation for students who want to go on to law school, business school, advanced work in economics, or graduate work in international relations. It is also a good background for careers in management and positions with the government.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**17-20**
Economics 1A-1B	8
Statistics 13, 32, or 102	3-4
Mathematics 16A-16B or 21A-21B	6-8
Depth Subject Matter	**44**
Economics 100, 101	8
Economics 102	4
One course from Economics 110A, 110B, 111A, 111B	4
Select 16 units from Economics 103, 106, 116, 121A, 121B, 122, 130, 131, 132, 134 (or Agricultural and Resource Economics 171A), 135, 136, 137, 140 (or Agricultural and Resource Economics 106), 145, 151A, 151B, 152, 160A, 160B, 194HA, 194HB, Agricultural and Resource Economics 139, 156, 175, 176	16
Additional upper division Economics courses	12
Total Units for the Major	**61–64**

Recommended. Students considering graduate study in economics are strongly urged to take Mathematics 21A-21B-21C and 22A.

The Economics Department suggests that Economics 100 and 101 be taken as soon as possible after the introductory courses.

Major Advisers. Contact Department office.

Minor Program Requirements:

	UNITS
Economics	**20**
Economics 100, 101	8
Select 8 units from Economics 103, 106, 116, 121A, 121B, 122, 130, 131, 132, 134 (or Agricultural and Resource Economics 171A), 135, 136, 137, 140 (or Agricultural and Resource Economics 106), 145, 151A, 151B, 152, 160A, 160B; Agricultural and Resource Economics 139, 156, 175, 176	8
Select 4 units from upper division Economics courses	4

Preparation. Economics 1A and 1B; Statistics 13, 32, or 102; Mathematics 16A and 16B or 21A and 21B. Mathematics 16A and 16B or 21A and 21B should be completed before taking Economics 100 and 101. Students need to complete Economics 100 and 101 before taking the advanced courses.

Course Limits. Except under extraordinary circumstances, not more than three economics courses may be taken in any one quarter. In special cases, the department will accept a limited number of related upper division courses from other departments in satisfaction of the economics upper division course requirements. Approval from a departmental adviser is required in all such cases.

Graduation with High or Highest Honors. To be eligible for departmental recommendation for High or Highest Honors in Economics at graduation, a student must take all upper division courses in Economics for a letter grade, earn at least a 3.500 grade point average in those courses, and complete at least eight units of course work that result in the submission of an Honors project. Consult the College of Letters and Science section of this catalog and contact the Department for more information.

Study Abroad. The economics department wishes to accommodate students who would like to complement their economics degree with a study abroad experience. Up to 20 units of upper division credit from foreign campuses (excluding Economics 100 and 101) may be used towards the completion of the degree. To ensure that foreign courses will apply towards the economics degree, students need to select courses from the pre-approved list at EAP or seek pre-approval in the economics department for the foreign courses they wish to complete.

Graduate Study. Students who meet the admission requirements of Graduate Studies and the Department of Economics may pursue studies leading to the M.A. and Ph.D. degrees. Fields of emphasis for graduate study include: Economic Theory, Monetary Economics, Economic Development, Economic History, International Economics, Labor Economics, Industrial Organization, Economic Systems, Public Finance, Mathematical Economics, and Quantitative Methods (Econometrics). For information on admission to graduate study, degree requirements, and financial aid, consult the Graduate Announcement and *http://www.econ.ucdavis.edu*.

Graduate Advisers. Contact Department office.

American History and Institutions. This University requirement can be satisfied by completion of Economics 111A, 111B; see also under University requirements.

Courses in Economics (ECN)

Lower Division Courses

1A. Principles of Microeconomics (4)
Lecture—3 hours; discussion—1 hour. Course 1A and 1B may be taken in either order. Analysis of the allocation of resources and the distribution of income through a price system; competition and monopoly; the role of public policy; comparative economic systems. GE credit: SocSci.—I, II, III. (I, II, III.)

1B. Principles of Macroeconomics (4)
Lecture—3 hours; discussion—1 hour. Course 1A and 1B may be taken in either order. Analysis of the economy as a whole; determinants of the level of income, employment and prices; money and banking, economic fluctuations, international trade, economic development; the role of public policy. GE credit: SocSci.—I, II, III. (I, II, III.)

90X. Lower Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Economics through shared readings, discussions, and written assignments. May not be repeated for credit. Limited enrollment.

92. Internship and Field Work (1-12)
Internship—3-36 hours; term paper. Prerequisite: junior or senior standing; availability of internship position or approved field work project; stock-brokerage interns must have completed Management

11A-11B; consent of instructor. Intensive study of practical application of concepts in economics, stressing research methods and empirical analysis. (P/NP grading only.)

98. Group Study for Undergraduates (1-5)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Individual Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Intermediate Micro Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B; Mathematics 16A-16B or 21A-21B with grade of C- or better in each. Price and distribution theory under conditions of perfect and imperfect competition. General equilibrium and welfare economics. Not open for credit to students who have completed Agricultural and Resource Economics 100A or 100B.—I, II, III. (I, II, III.)

101. Intermediate Macro Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B; Mathematics 16A-16B or 21A-21B with grade of C- or better in each. Theory of income, employment and prices under static and dynamic conditions, and long term growth.—I, II, III. (I, II, III.)

102. Analysis of Economic Data (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B, Statistics 13 or 32, Mathematics 16A-16B or 21A-21B, with grade of C- or better in each, or consent of instructor. Analysis of economic data to investigate key relationships emphasized in introductory microeconomics and macroeconomics. Obtaining, transforming, and displaying data; statistical analysis of economic data; and basic univariate and multivariate regression analysis. Only 2 units of credit allowed to students who have completed course 140 or Agricultural and Resource Economics 106.—I, II, III. (I, II, III.)

103. Economics of Uncertainty and Information (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100, Mathematics 16A and 16B or Mathematics 21A and 21B. Optimal decisions under uncertainty, expected utility theory, economics of insurance, asymmetric information, signalling in the job market, incentives and Principal-Agent theory, optimal search strategies and the reservation price principle.—(I, II.)

106. Decision Making (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100; Mathematics 16A-16B or 21A-21B; Statistics 13 or 32, with grade of C- or better in each course, or consent of the instructor. Descriptive and normative analysis of individual decision making, with applications to personal, professional, financial, and public policy decisions. Emphasis on decision making under uncertainty and over time. Heuristics and biases in the psychology of decisions; overcoming decision traps.

110A. World Economic History Before the Industrial Revolution (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A and 1B. Development and application of analytical models to explain the nature and functioning of economies before the Industrial Revolution. Examples will be drawn from a variety of societies, including England, China, Polynesia, and Pre-Columbian America. GE credit: SocSci.—II. (II.)

110B. World Economic History Since the Industrial Revolution (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B and 110A. Development and application of analytical models to explain the nature and functioning of economies since the Industrial Revolution. Examples will be drawn from a variety of societies, including England, China, Germany, and India. GE credit: SocSci.—I, III. (I, III.)

111A. Economic History (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in the United States from Colonial times to 1865; reference to other regions in the Western Hemisphere. GE credit: SocSci.—I, III. (I, III.)

111B. Economic History (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, or consent of instructor. Survey of economic change in the United States from 1865 to the post World War II era. GE credit: SocSci.—II. (II.)

115A. Economic Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Major issues encountered in emerging from international poverty, including problems of growth and structural change, human welfare, population growth and health, labor markets and internal migration. Important issues of policy concerning international trade and industrialization. (Same course as Agricultural and Resource Economics 115A.) GE credit: SocSci, Div.—I, II, III. (I, II, III.)

115B. Economic Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Major macroeconomic issues of developing countries. Issues include problems in generating capital, conduct of monetary and fiscal policies, foreign aid and investment. Important issues of policy concerning international borrowing and external debt of developing countries. (Same course as Agricultural and Resource Economics 115B.) GE credit: SocSci.—I, II, III. (I, II, III.)

116. Comparative Economic Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100; Mathematics 16B and 21B. Economics analysis of the relative virtues of capitalism and socialism, including welfare economics. Marxian exploitation theory, the socialist calculation debate (Hayek and Lange), alternative capitalist systems (Japan, Germany, U.S.) and contemporary models of market socialism.

121A. Industrial Organization (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B; 100, or consent of instructor. An appraisal of the role of competition and monopoly in the American economy; market structure, conduct, and economic performance of a variety of industries. GE credit: SocSci.—I, II, III. (I, II, III.)

121B. Industrial Organization (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B, 100, or consent of instructor. The study of antitrust and economic regulation. Emphasis on applying theoretical models to U.S. industries and case studies, including telecommunications, software, and electricity markets. Topics include natural monopoly, optimal and actual regulatory mechanisms, deregulation, mergers, predatory pricing, and monopolization.—I, III. (I, III.)

122. Theory of Games and Strategic Behavior (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100, Mathematics 16A and 16B or 21A and 21B or consent of instructor. Introduction to game theory. Explanation of the behavior of rational individuals with interacting and often conflicting interests. Non-cooperative and cooperative theory. Applications to economics, political science and other fields.—II, III. (II, III.)

130. Public Microeconomics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100, or consent of instructor. Public expenditures; theory and applications. Efficiency and equity of competitive markets; externalities, public goods, and market failures; positive and normative aspects of public policy for expenditure, including benefit-cost analysis. Topics include consumer protection, pollution, education, poverty and crime.—I, II, III. (I, II, III.)

131. Public Finance (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Economic burden of taxation; equity and efficiency considerations in tax design; structure and economic effects of the U.S. tax system (including personal income tax, corporation income tax, and property tax); tax loopholes; recent developments; tax reform proposals.—I, II, III. (I, II, III.)

132. Health Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. The health care market, emphasizing the role and use of economics. Individual demand, provision of services by doctors and hospitals, health insurance, managed care and competition, the role of government access to health care.—II. (II.) Cameron

134. Financial Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, and 100; Mathematics 16A; Statistics 13. General background and rationale of corporation; finance as resource allocation over time; decision making under uncertainty and the role of information; capital market and interest rate structure; financial decisions. Students who have completed Agricultural and Resource Economics 171A may not receive credit for this course.—I, II, III. (I, II, III.)

135. Money, Banks and Financial Institutions (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101; Statistics 13. Banks and the banking system. Uncertainty and asymmetric information in the lending process; efficiency of competitive equilibrium in lending markets. Regulation and the conduct of monetary policy.—I, III. (I, III.)

136. Topics in Macroeconomic Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Advanced Topics in macroeconomics theory. The course develops the theoretical and empirical analysis of a specific field of macroeconomics. Possible topics include, business cycle theories, growth theory, monetary economics, political economics and theories of unemployment and inflation.—III. (III.)

137. Macroeconomic Policy (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Theory and practice of macroeconomic policy, both monetary and fiscal.—(III.)

140. Econometrics (4)
Lecture—3 hours; discussion—1 hours. Prerequisite: course 102, course 100 and course 101; Mathematics 16A and 16B or Mathematics 21A and 21B; Statistics 13, or any upper division Statistics course. Problems of observation, estimation and hypotheses testing in economics through the study of the theory and application of linear regression models. Critical evaluation of selected examples of empirical research. Exercises in applied economics. Not open for credit to students who have enrolled in or completed Agricultural and Resource Economics 106.—I, II, III. (I, II, III)

145. Transportation Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100, Mathematics 16A, 16B, Statistics 13 or consent of instructor. Intended for advanced economics undergraduates. Examination of fundamental problems of planning and financing transportation "infrastructure" (roads, ports, airports). The economics of the automobile industry, as well as the impact of government regulation and deregulation in the airlines and trucking industries.—II. (II.) Knittel

151A. Economics of the Labor Market (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Theory of labor supply and demand; determination of wages and employment in the labor market. Policy issues: labor force participation by married women; minimum wages and youth unemployment; effect of unions on wages.—I, II, III. (I, II, III.)

151B. Economics of Human Resources (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 151A. Human resource analysis; introduction to human capital theory and economics of education; the basic theory of wage differentials, including theories of labor market discrimination; income dis-

tribution; poverty. Policy issues; negative income tax; manpower training programs; incomes policy.—I, II. (I, II.)

152. Economics of Education (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100; course 102; Mathematics 16B or 21B; Statistics 13 or 32, with grade of C- or better in each course, or consent of the instructor. Application of theoretical and empirical tools of economics to the education sector. Demand for Education; Education Production and Market Structures in Education. Policy applications: class size reduction, school finance equalization, accountability, and school choice.—III. (III.)

160A. International Microeconomics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100, or consent of instructor. International grade theory: impact of trade on the domestic and world economies; public policy toward external trade. Only two units of credit allowed to students who have completed course 162.—I, II, III. (I, II, III.)

160B. International Macroeconomics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 100, 101, or consent of instructor. Macroeconomic theory of an open economy. Balance of payments adjustment mechanism, international monetary economics issues; international financial institutions and their policies. Only two units of credit allowed to students who have completed course 162.—I, II, III. (I, II, III.)

162. International Economic Relations (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. International trade and monetary relations, trade policy, exchange rate policy, policies toward international capital migration and investment. Emphasis on current policy issues. Course intended especially for non-majors. Not open for credit to students who have completed course 160A or 160B. GE credit: SocSci.—I, II, III. (I, II, III.)

171. Economy of East Asia (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Intensive reading, discussion and research on selected topics from the economies of the countries of East Asia. Consult department for course scheduling.—II. (II.)

190. Topics in Economics (4)
Lecture/discussion—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Selected topics in economic analysis and public policy. Variable content. May be repeated for credit.

190X. Upper Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite: courses 100 and 101, and consent of the instructor. In-depth examination at an upper division level of a special topic in Economics. Emphasis on focused analytical work.

192W. Internship in the Davis-in-Washington Program (6-8)
Internship—18-24 hours. Prerequisite: junior or senior standing in Economics; completion of 84 units of credits with a minimum grade-point average of 3.000; admission to the Davis-in-Washington Program. Internship in Washington, DC with associated research project. Students must arrange for a faculty sponsor before embarking on the internship. Maximum of 3 units will count toward satisfying Economics major requirements. (P/NP grading only.)

194HA-194HB. Special Study for Honors Students (4-4)
Independent study—3 hours; seminar—1 hour. Prerequisite: major in Economics with senior standing; consent of instructor and completion of 135 units with a minimum GPA of 3.500 in courses counted toward the major. A program of research culminating in the writing of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of course.)

197T. Tutoring in Economics (1-5)
Tutorial—3-15 hours. Prerequisite: consent of instructor and chairperson. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. May be repeated for up to 10 units of credit. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200A. Microeconomic Theory (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing. Linear and non-linear optimization theory applied to develop the theory of the profit-maximizing firm and the utility-maximizing consumer. (Same course as Agricultural and Resource Economics 200A.)—I. (I.) Silvestre

200B. Microeconomic Theory (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Characteristics of market equilibrium under perfect competition, simple monopoly and monopsony. Emphasis on general equilibrium and welfare economics; the sources of market success and market failure. (Same course as Agricultural and Resource Economics 200B.)—II. (II.) Quinzii

200C. Microeconomic Theory (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200B. Uncertainty and information economics. Individual decision making under uncertainty. Introduction to game theory, with emphasis on applications to markets with firms that are imperfect competitors or consumers that are imperfectly informed. (Same course as Agricultural and Resource Economics 200C.)—III. (III.) Bonanno

200D. Macroeconomic Theory (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: course 101, Mathematics 21A, 21B, and 21C. Macro static theory of income, employment, and prices.—II. (II.) Rendahl

200E. Macroeconomic Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B (may be taken concurrently) and 200D. Macrodynamic theory of income, employment, and prices.—III. (III.) Geromichales

201A. History of Economic Thought (4)
Lecture—3 hours; discussion—1 hour. Economic thought from the classical Greece era to modern times. Offered in alternate years.

201B. History of Economic Thought II (4)
Lecture—3 hours; discussion—1 hour. Origins and emergence of modern economic analysis. Offered in alternate years.

203A. Advanced Economic Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A; 200B. Advanced topics in general equilibrium theory and welfare economics: existence, determinateness and efficiency; intertemporal economies; uncertainty.—II. (II.) Quinzii

203B. Advanced Economic Theory: Game Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 200B, 200C. Covers the most recent developments in game theory, with the focus changing from year to year. Main topics are: refinements of Nash equilibrium, repeated games, evolution, social situations, bounded rationality, and bargaining theory.—III. (III.) Schipper

203C. Topics in Economic Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 200B, 200C. Selected topics in contemporary microeconomic theory. May be repeated for credit with the consent of the Graduate Studies Committee.

210A. Economic History (4)
Lecture/discussion—4 hours. Economic history of the eastern hemisphere in the modern period. Medieval Europe or other regions may be studied, depending on student interest.—I. (I.) Clark

210B. Economic History (4)
Lecture/discussion—4 hours. The United States from Colonial times to the present. Other areas of the western hemisphere may be studied, according to student interest.

210C. Economic History (4)
Seminar—4 hours. Prerequisite: a graduate course in economic history. Selected topics and issues, emphasis on current research. (Quarter offered to be flexible.)—II. (II.) Meissner

214. Development Economics (4)
Lecture—4 hours. Prerequisite: Agricultural and Resource Economics 100A, 100B, course 101; Agricultural and Resource Economics/Economics 204 and course 160A-160B recommended. Review of the principal theoretical and empirical issues whose analysis has formed development economics. Analysis of economic development theories and development strategies and their application to specific policy issues in developing country contexts. (Same course as Agricultural and Resource Economics 214.)—II. (II.) Boucher

215A. Microdevelopment Theory and Methods I (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204; course 240A recommended. Agricultural development theory, with a focus on microeconomics. Agricultural household behavior with and without market imperfections and uncertainty. Analysis of rural land, labor, credit and insurance markets, institutions, and contracts. (Same course as Agricultural and Resource Economics 215A.)—I. (I.) Taylor

215B. Open Macroeconomics of Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics/Economics 200A or 204, 200D or 205, and 214 or 215A. Models and policy approaches regarding trade, monetary and fiscal issues, capital flows and debt are discussed in the macroeconomic framework of an open developing country. The basic analytical focus is real exchange rate and its impact on sectoral allocation of resources. (Same course as Agricultural and Resource Economics 215B.)—II. (II.) Boucher

215C. Microdevelopment Theory and Methods II (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 215A. Extension of development theory and microeconomic methods. Agricultural growth and technological change; poverty and income inequality; multisectoral, including village and regional models. Computable general equilibrium methods and applications. (Same course as Agricultural and Resource Economics 215C.)—III. (III.) Rozelle

215D. Environment and Economic Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A, 204 or Agricultural and Resource Economics 275. Interdisciplinary course drawing on theoretical and empirical research on interactions between environmental resource use and economic development processes. Analysis of issues emerging at the interface of environmental and development economics. (Same course as Agricultural and Resource Economics 215D.)—III. (III.)

221A. The Theory of Industrial Organization (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A, 200B, 200C. Game theory is used to analyze strategic interaction of firms in industries. Topics include models of competition, product differentiation, entry-deterring strategies, contractual arrangements, vertical control and antitrust issues.—I. (I.) Bonanno

221B. Empirical Analysis in Industrial Organization (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 221A and 240B. Recent empirical work in industrial organization. Topics include empirical

analysis of cartels, product differentiation, innovation and technological change, and imperfect competition in international markets.—II. (II.) Knittel

221C. Industrial Organization and Regulation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 221A and 240B. Optimal regulation of natural monopoly. Topics include regulatory mechanisms for single and multiple output firms under symmetric and asymmetric information, optimality without regulation, the economic theory of regulation, and empirical studies of regulation and deregulation.—III. (III.) Rapson

230A. Public Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200C. Measures of deadweight loss and consumer surplus; optimal commodity and income taxation; tax incidence; policy issues in personal taxation, corporate taxation, and social insurance; the evaluation of effective tax rates.—II. (II.) Helms

230B. Public Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 230A, 240A, 240B. Effects of government policies on economic behavior; labor supply, program participation, investment, consumption and savings.—I. (I.) Miller

230C. Public Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200C and 240B. Advanced topics in economics of the public sector, with emphasis on current research. Topics may vary from year to year.—III. (III.) Carrell, Stevens

235A. Alternative Approaches to Monetary Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D (may be taken concurrently). Focuses on relation between changes in money supply and changes in nominal GNP. Also discusses the effect of changes in money supply on interest rates.—(I.) Salyer

235B. Monetary Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 235A. Emphasizes problem of finding an appropriate place for money in microeconomic/general equilibrium models. Consideration given to meaning of money, its relation to inflation and the real economy and to its role in models of finance.—II. (II.) Geromichalos

235C. Monetary Policy (4)
Lecture—3 hours; discussion—1 hour. Organization of the Federal Reserve Bank, the definition of money, goals and tools of monetary policy, alternative targets for monetary policy, impact of monetary policy, the problem of lags, alternative policies.—(III.)

239. Econometric Foundations (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in undergraduate-level econometrics. The course will prepare students for econometric theory and empirical work by examining the statistical foundation of econometrics. Special attention is paid to problems specific to non-experimental data common to social sciences. Topics from matrix algebra are also covered. (Same course as Agricultural & Resource Economics 239.)—I. (I.) Green

240A. Econometric Methods (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 133 and a course in linear algebra or the equivalent. Least squares, instrumental variables, and maximum likelihood estimation and inference for single equation linear regression model; linear restrictions; heteroskedasticity; autocorrelation; lagged dependent variables. (Same course as Agricultural and Resource Economics 240A.)—II. (II.) Das

240B. Econometric Methods (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A. Topics include asymptotic theory and instrumental variables, pooled time-series cross-section estimation, seemingly unrelated regression, classical hypothesis tests, identification and estimation of simultaneous equation models, cointegration, error-correction models, and qualitative and limited dependent variable models. (Same course as Agricultural and Resource Economics 240B.)—III. (III.) Havenner

240C. Time Series Econometrics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Probability theory; estimation, inference and forecasting of time series models; trends and non-standard asymptotic theory; vector time series methods and cointegration; time series models for higher order moments and transition data; state-space modeling and the Kalman filter. (Same course as Agricultural and Resource Economics 240C).—II. (II.) Kuersteiner

240D. Cross Section Econometrics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Estimation and inference for nonlinear regression models for crosssection data; models for discrete data and for limited dependent variables; models for panel data; additional topics such as bootstrap and semiparametric regression. (Same course as Agricultural and Resource Economics 240D)—I. (I.) Cameron

240E. Topics in Time Series Econometrics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 240A, 240B and 240C. Modern econometric techniques for time series data. Expand on topics covered in Economics 240A, 240B and 240C. Contents may vary from year to year. (Same course as Agricultural and Resource Economics 240E.)—III. (III.) Jorda

240F. Topics in Cross Section Econometrics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 240A, 240B and 240D. Modern econometrics techniques for cross-section data. Expand on topics covered in Economics 240A, 240B and 240D. Contents may vary from year to year. (Same course as Agricultural and Resource Economics 240F.)—III. (III.) Cameron

250A. Labor Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 150A-150B or the equivalent. Philosophy, theory and history of American and foreign labor movements; union structure, organization and collective bargaining under changing labor market conditions; current labor market issues.—III. (III.) Stevens, Carrell

250B. Labor Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 151A or consent of instructor; course 204 or 200A recommended. Microeconomic theory of labor supply and labor demand, estimation of labor supply and demand functions; human capital theory; labor market analysis.—II. (II.) Page

256. Applied Econometrics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics 106 or Economics 140, or the equivalent. Application of statistical tools to economic and business analysis. Emphasis on regression analysis, problems of specification, and model development. (Same course as Agricultural and Resource Economics 256.)—II. (II.)

260A. International Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A or 204. Theory of trade determinants; gains from trade; tariffs and effective protection; economic unions.—I. (I.) Feenstra

260B. International Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200D and 200E. Balance of payments adjustment mechanisms; foreign exchange markets' theories of balance of payments policy and international monetary mechanisms.—(I.) Bergin

260CN. International Investment and Trade (4)
Seminar—4 hours. Prerequisite: course 260A. Analysis of foreign investment and its links to trade; theories of the firm as they relate to firm's export and investment decisions; and an introduction to the political economy of trade policies.—II. (II.) Swenson

260D. Topics in International Macroeconomics (4)
Seminar—4 hours. Prerequisite: course 260B or consent of instructor. Survey of current literature in international macroeconomic theory.—III. (III.) Simonovska

260E. Topics in International Trade (4)
Seminar—4 hours. Prerequisite: course 260A, 260B. Current literature in international trade theory.—III. (III.) Russ

270A. Economics of Growth (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D and 200E. Modern theories and empirics of economic growth beginning with the neoclassical theories up to current endogenous growth models. Emphasis on the analysis of human capital and growth, technological innovation, its diffusion and empirical evidence on growth.—(I.) Peri

270B. Economics of Growth (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D and 200E. Empirical analysis of growth patterns and growth models. Emphasis on the relationship between macroeconomic management and long-term growth; the use of foreign capital in accelerating growth and its occasional mishaps; the comparison of growth performance in East Asia and Latin America since WW2; the experiences of centrally-planned economies and transitions to market-based growth; and the transformation from an industrial economy to a knowledge economy.—(II.) Woo

270C. Economics of Growth (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D and 200E. Institutional bases; politics; contracts and commitment; money and finance; malthusian dynamics; modern economic growth; transition of industrialization; dual economies, core and periphery; sources of convergence and divergence; openness and growth; resources, demography, and geography; institutions, imperialism, and class conflicts.—(III.) Taylor

280. Orientation to Economic Research (2)
Discussion—2 hours. Course tries to bridge the gap between students' classwork and their subsequent research. It deals with topics such as the origination of a research project, some mechanics of empirical research and hints on the submission of research papers. (S/U grading only.)

290. Topics in Economics (4)
Seminar—4 hours. Prerequisite: consent of instructor. Selected topics in economic analysis and public policy, focusing on current research. May be repeated for credit.

291. Contemporary Economics Seminar (2)
Seminar—2 hours. Prerequisite: graduate standing in Economics. Seminar series on topics of current interest. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
Discussion—1-5 hours. Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299. Individual Study (1-12)
Prerequisite: consent of instructor and graduate standing. (S/U grading only.)

299D. Dissertation Research (1-12)
(S/U grading only.)

Professional Course

397. Teaching of Economics (2)
Lecture/discussion—2 hours. Prerequisite: graduate standing in economics. Teaching of economics: methods of instruction, organization of courses, examination and evaluation procedures. (S/U grading only.)—I. (I.) Bergin

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Program Coordinator: (530) 754-6664

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Paul E. Heckman, Program Chair
Program Coordinator: (530) 752-7259

Teacher Education-Credential

Paul E. Heckman, Program Chair
Christian Faltis, Director of Teacher Education
Barbara G. Goldman, Associate Director of Teacher Education
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Minor Program Requirements:

The UC Davis School of Education is committed to developing informed citizens and advocates for productive educational environments in a democratic society. Education courses are designed for undergraduate students from all majors.

A Minor in Education will help students:

- Develop an understanding of the issues and concerns of public and private education
- Complete prerequisites for the teaching credential program
- Work towards a master's degree or doctoral degree in education or related field
- Seek employment in policy, advocacy, or other education related careers

Courses. Students must complete 20 units the Minor program in Education. At least 12 units of the 20-unit minimum for the minor must be in Education. The remaining units for the minor may be in education or a related field as approved on the electives list.

Minor Program Requirements:

UNITS

Upper Division Required Courses 12
Education 100, 110, 120 12

Elective Courses 8
The remaining eight units may be taken from the following courses:
Education 115 2
Education 119, 122, 130, 142, 147, 173 4
Education 192, 198, 199 ..... variable

Approved Courses Outside of Education
Agricultural Education 100 3
Mathematics 197TC* 1-5
University Writing Program 197TC* 2-4
African American & African Studies 130; American Studies 152; Asian American Studies 101; Biological Sciences 195A or B*; Human Development 100A, 100B, 101; Linguistics 173; Psychology 130, 132; Sociology 124; Spanish 116, 117; University Writing Program 104D 4

* Internship (192, 195A or B, 195TC, 197TC) and Independent Study (199), or a combination of both, may not exceed a total of four units. Elective courses may include only one internship.

Minor Advisers. A designated faculty member in the School of Education may advise students and give final approval on the minor. For additional information contact the Student Services office in School of Education Building.

Courses in Education (EDU)

Lower Division Courses

81. Learning in Science and Mathematics (2)
Lecture/discussion—2 hours; field work—2 hours. Exploration of how students learn and develop understanding in science and mathematics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate factors that affect student learning. Limited enrollment. (Same course as Geology 81.) (P/NP grading only.)—I, II, III. (I, II, III.)

92. Internship (1-3)
Internship—3-9 hours. Prerequisite: consent of instructor. Enrollment dependent on availability of intern placements. Internship as a teacher's aide or tutor in K-12 classrooms under the supervision of a faculty member. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses

100. Introduction to Schools (4)
Lecture—3 hours; field work—3 hours. Prerequisite: upper division standing. Study of occupational concerns of teachers; skills for observing classroom activities; school organization and finance; school reform movement; observing, aiding, and tutoring in schools.—I, II, III. (I, II, III.) Ambrose, Trexler, Tonkovich

110. Educational Psychology: General (4)
Lecture/discussion—4 hours. Prerequisite: Psychology 1; upper division standing. Learning processes, cognitive development, individual differences, testing and evaluation. GE credit: SocSci, Wrt.—I, II, III. (I, II, III.) Booker, Ching, Martin, Passmore, White

114. Quantitative Methods in Educational Research (4)
Lecture/discussion—4 hours. Prerequisite: two years of high school algebra. Problems and methods in data analysis. Design of research projects. Some consideration of procedures suited to digital computers.—I. (I.) Martin

115. Educating Children with Disabilities (2)
Lecture—2 hours. Prerequisite: upper division standing. Educational issues and processes involved in teaching children with disabilities. The course will focus on the structure of special education, with an emphasis on meeting the educational needs of children who are mainstreamed in regular classes.—I, III. (I, III.) Martin

119. The Use and Misuse of Standardized Tests (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110 or consent of instructor. Principles underlying educational and psychological testing. Purposes of testing for individual achievement and evaluation of school programs. Interpretation and misinterpretations of outcomes. Analysis of SAT, GRE and other common tests. Experience in test administration and outcome interpretation. GE Credit: Wrt.—III. (III.) Abedi

120. Philosophical and Social Foundations of Education (4)
Lecture—3 hours; discussion—1 hours. Prerequisite: upper division standing. Philosophical, historical, and sociological study of education and the school in our society. GE credit: SocSci, Wrt.—I, II, III. (I, II, III.) Heckman, Kurlaender, Timar

122. Children, Learning and Material Culture (4)
Lecture/discussion—3 hours; extensive writing or discussion—1 hour; fieldwork. Prerequisite: upper division standing or consent of instructor. How material artifacts shape what and how children learn in school, at home, and in the community. Artifacts examined include books, computers, household appliances, toys and games, entertainment media, collectibles, sports equipment, clothing, folk arts and crafts, and neighborhood space. Offered in alternate years. GE credit: SocSci, Div, Wrt.—(II.) White

130. Issues in Higher Education (4)
Discussion—3 hours; field work—3 hours. Prerequisite: upper division standing or consent of instructor. Analysis of current issues in higher education and of some practical implications of varying philosophical approaches to the role of the university.—III. (III) Gonzalez

142. Introduction to Environmental Education (4)
Lecture—3 hours; field work. Study of history, philosophy, principles and approaches to environmental education (EE) and outreach; learning theories, teaching strategies and techniques in EE and outreach; evaluation of EE curricula in non-formal and in-school contexts; observing, aiding and facilitating local environmental education programs.—I. (I.) Ballard

147. Anglos, Latinos and the Spanish Black Legend: The Origins and Educational Implications of Anti-Hispanic Prejudice (4)
Lecture/discussion—3 hours; field work; term paper. Prerequisite: upper division standing or consent of instructor. Examination of anti-Hispanic prejudice in the United States focusing on the "Black Legend," a 16th Century anti-Spanish myth underpinning the doctrine of "Manifest Destiny." Exploration of the Legend's presence in contemporary American society through interviews and analysis of school textbooks. (Same course as Spanish 147.) GE Credit: ArtHum, Div, Wrt.—I. (I.) González

151. Language Development in the Chicano Child (3)
Lecture/discussion—3 hours. Prerequisite: some knowledge of Spanish and linguistics recommended. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom. Not open for credit to students who have completed course 151T.—III. (III.) Leonard-Fortes

151T. Language Development in the Chicano Child (3)
Lecture/discussion—3 hours. Prerequisite: some knowledge of Spanish and linguistics recommended. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish and the role of dialect varieties in the classroom. Not open for credit to students who have completed course 151.

152. Communication Skills for Bilingual Teachers (3)
Lecture—2 hours; field work—3 hours. Prerequisite: course 151; Spanish 2, 8A-8B. The development of communication skills of prospective educators with an emphasis on the study and use of standard Spanish and Southwest Spanish dialects in teaching science, mathematics, social science, music, art, and language arts to bilingual elementary school pupils.—III. (III.)

153. Cultural Diversity and Education (2)
Lecture/discussion—2 hours. Prerequisite: upper division standing. Analysis of research on learning styles among culturally diverse students with review and evaluation of responsive curricula and classroom teaching techniques. The ethnographic interview as a research tool. Not open for credit to students who have completed course 153T.—I. (I.) Leonard-Fortes, Rosa

153T. Cultural Diversity and Education (2)
Lecture/discussion—2 hours. Prerequisite: upper division standing. Open to UC Davis Teacher Credential candidates only. Analysis of research on learning styles among culturally diverse students with review and evaluation of responsive curricula and classroom teaching techniques. The ethnographic interview as a research tool. Not open for credit to students who have completed course 153.

160A. Introduction to Peer Counseling (2)
Lecture/discussion—2 hours. Prerequisite: upper division standing and consent of instructor. Introduction to peer counseling techniques and development of peer counseling skills. (P/NP grading only.)—I, II, III (I, II, III)

160B. Issues in Peer Counseling (2)
Lecture/discussion—2 hours. Prerequisite: upper division standing and consent of instructor; course 160A recommended. In-depth review and development of skills for specific counseling topics. May be repeated one time for credit when topic differs. (P/NP grading only.)—I, II, III. (I, II, III.)

163. Guidance and Counseling (4)
Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). Nature and scope of pupil personnel services; basic tools and techniques of guidance; theory and practice of counseling psychology, with emphasis on educational and vocational adjustment.

173. Language Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Linguistics 1 or consent of instructor; Linguistics 103A, 103B. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (Same course as Linguistics 173.)—III. (III.) Tonkovich, Uchikoshi

180. Computers in Education (3)
Lecture—1 hour; seminar—1 hour; laboratory—3 hours. Prerequisite: upper division or graduate standing. Applications of computers in education as instructional, intellectual, and communication tools. Not open for credit to students who have completed course 180T, 181, or 182.—I, II. (I, II.) Bellman, Martindale, Mendle, Pomeroy

180T. Computers in Education (3)
Lecture—1 hour; seminar—1 hour; laboratory—3 hours. Prerequisite: upper division or graduate standing. Applications of computers in education as instructional, intellectual, and communication tools. Not open for credit to students who have completed course 180, 181, or 182.—I, III. (I.III) Bellman, Martindale, Mendle, Pomeroy, White

181. Teaching in Science and Mathematics (2)
Lecture/discussion—2 hours; field work—2 hours. Prerequisite: Geology 81/Education 81, previous experience in a K-12 classroom, or consent of instructor. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Selected readings, discussion and field experience in middle school classrooms. (Same course as Geology 181.) (P/NP grading only.)—I, II, III. (I, II, III.) Horn

182. Computer Project for Curricular Integration (1)
Seminar—1 hour. Prerequisite: Agricultural Systems and Environment 21 or appropriate microcomputer course, experience with instructional computing and consent of instructor. Design and implementation of a curricular unit to integrate computer technology into a K-12 classroom setting. A project-based seminar intended for students with substantial prior experience with instructional use of computers and related technologies. Not open for credit to students who have completed course 180 or 181.

183. Teaching High School Mathematics and Science (3)
Lecture/discussion—2 hours; field work—3 hours. Prerequisite: Geology 81/course 81 or Geology 81/course 181 or consent of instructor. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. Limited enrollment. (Same course as Geology 183.)—I, II, III. (I, II, III.) Stevenson

192. Internship (1-3)
Internship—2-8 hours; discussion—1 hour. Prerequisite: upper division standing and consent of instructor. Internship as a tutor, teacher's aide, or peer counselor in a school or educational counseling setting under the supervision of a faculty member. May be repeated for credit. (P/NP grading only.)

197T. Tutoring in Education (1-2)
Tutoring—1-2 hours. Prerequisite: upper division standing and consent of instructor. Leading of small voluntary discussion groups affiliated with the School's upper division courses under the supervision of, and at the option of, the course instructor, who will submit a written evaluation of the student's work. May be repeated one time for credit for a total of 4 units. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Courses

200. Educational Research (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: introductory statistics and graduate standing in education or consent of instructor. Defining educational research questions, reviewing relevant literature, developing research designs, developing research instruments, selecting appropriate data analysis procedures, and writing research projects. A case problem will provide practice in designing and reporting research.—I. (I.) Young

201. Qualitative Research in Education (4)
Seminar—2 hours; lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Examines the design and conduct of educational research using non-numerical data (e.g., text, discourse, imagery and artifacts). Focuses on issues (e.g., valid-

ity, reliability, generalizability, ethics) and reporting genres (e.g., narrative accounts, case studies, and arguments).—II. (II.) Enright

202N. Computer Analysis of Qualitative Data (4)
Seminar—3 hours; laboratory—2 hours. Prerequisite: graduate standing or upper division standing with consent of instructor. Critical and practical understanding of how to use computer software programs to analyze qualitative data (text, images, and videotape) in conducting social research. Offered in alternate years.

203. Educational Testing and Evaluation (4)
Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Introduces the theoretical assumptions underlying traditional test construction, as well as the basic statistical principles involved in the design, evaluation, and interpretation of standardized tests. Also introduces the debates surrounding the uses of different kinds of tests and evaluation tools.—III. (III.) Abedi

204A. Quantitative Methods in Educational Research: Analysis of Correlational Designs (4)
Discussion—2 hours; laboratory/discussion—2 hours. Prerequisite: course 114 or the equivalent. Methods for analysis of correlation data in educational research. Topics include multiple correlation and regression, discriminant analysis, logistic regression, and canonical correlation. Emphasis on conceptual understanding of the techniques and use of statistical software. Offered in alternate years.—II. (II.) Kurlaender

204B. Quantitative Methods in Educational Research: Experimental Designs (4)
Discussion—2 hours; discussion/laboratory—2 hours. Prerequisite: course 114 or the equivalent. Methods for analysis of experimental data in educational research. Topics include ANOVA, fixed v. random effects models, repeated measures ANOVA, analysis of co-variance, MANOVA, chi square tests, small sample solutions to t and ANOVA.—I. (I.) Abedi

205A. Ethnographic Research in Schools I: Current Theory and Practice (4)
Lecture—4 hours. Prerequisite: graduate standing. Current literature from anthropology and society related to schools. Emphasis on the organizational structure of institutions, and the analysis of face-to-face interaction. Will explore the relationship between field-based research and theory development on the acquisition of knowledge in specific social and cultural contexts.—I. (I.) Watson-Gegeo

205B. Ethnographic Research in Schools II: Field-Based Research Projects (4)
Discussion—4 hours. Prerequisite: graduate standing and course 205A. Student research projects in specific schools with cooperative critical analysis of the design, data collection, and inferencing by researchers. Students will continue to meet with instructor as a group throughout the quarter to discuss specific projects.—II. (II.) Watson-Gegeo

206A. Inquiry into Classroom Practice: Traditions and Approaches (2)
Lecture/discussion—2 hours; fieldwork. Prerequisite: consent of instructor; open to graduate teaching credential students. Introduction to traditions and approaches of teachers conducting research in their own classrooms: purposes, focal areas, methods of data collection and analysis, and written genre conventions.—II. (II.)

206B. Inquiry into Classroom Practice: Application of Teacher Research Approaches (4)
Lecture/discussion—3 hours; fieldwork—1 hour. Prerequisite: satisfactory completion of course 206A or consent of instructor; open to graduate teaching credential students. Analysis and application of teacher research through the development, implementation and evaluation of a short-term classroom research-based intervention. Particular attention to research that enhances learning of English language learners and under-performing students.—III. (III.)

206C. Inquiry into Classroom Practice: Study Design (4)
Seminar—3 hour; fieldwork—1 hours. Prerequisite: satisfactory completion of course 206B or consent of instructor. Proposal development for classroom-based inquiry designed to address student learning needs. Mixed methods research design and preliminary data collection approaches. Design and application of baseline student assessment for proposal development. Literature review. Data collection in K-12 classrooms required. Open to Graduate MA Credential students only.—I. (I.) Ambrose, Ballard, Faltis, Merino, Tonkovich, Uchikoshi, White

206D. Inquiry into Classroom Practice: Data Analysis and Research Reporting (4)
Seminar—2 hours; fieldwork—1 hour; extensive writing or discussion. Prerequisite: satisfactory completion of course 206C or consent of instructor. Support of the inquiry begun in course 206C through continuous collaborative critique and feedback resulting in the writing and presentation of a research study. Open to Graduate MA Credential students.—II. (II.) Ambrose, Ballard, Faltis, Merino, Tonkovich, Uchikoshi, White

207. Concepts of the Curriculum (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Development of the skills of philosophical analysis and argument for the establishment of a point of view, in the consideration of curriculum theory and practice. Classical and contemporary approaches to subject matter and activity emphases, hidden curriculum, and moral education.—I. Heckman

208. Presenting Educational Research in Written Reports (4)
Seminar—3 hours; extensive writing. Prerequisite: graduate standing or consent of instructor. Rhetorical and substantive challenges of presenting educational research through written reports; research rhetoric and genres; competing discourse conventions of educational research, policy, and practice; the social organization of publishing educational research. May be repeated one time for credit. Offered in alternate years.

209. Image-based Field Research (4)
Lecture/discussion—3 hours; fieldwork—2 hours. Prerequisite: graduate standing or upper division standing with consent of instructor. Critical and practical understanding of video tape and still photography as resources for enhancing field research in schools and other social setting. Offered in alternate years.

210. The Psychology of School Learning (4)
Lecture/discussion—4 hours. Study of human learning theory and research related to learning in school. Classical approaches of scholars such as Ausubel, Bruner, Gagne, Piaget, Vygotsky, Skinner. Review of contemporary issues of constructivism, metacognition, problem solving, learning strategies, science and mathematics learning.—III. Martin, White

211. Sociocultural and Situative Perspectives on Learning and Cognition (4)
Lecture/discussion—3 hours; extensive writing—1 hour. Prerequisite: graduate standing or consent of instructor. Sociocultural and situative theories of cognition and learning. Major ideas of L.S. Vygotsky, followed by modern perspectives: situated cognition, cognitive apprenticeship, situated learning, communities of practice, cultural-historical activity theory, and distributed cognition. Implications of each theoretical perspective for educational practice. Offered in alternate years.—(III.) Carter Ching, White

213. Individual Assessment (4)
Lecture—4 hours. Prerequisite: courses 114 and 219, admission to school psychology credential program. Theories of intellectual functioning and the measurement of cognitive abilities in school-aged children. Supervised practice in administration and scoring of contemporary tests for children including the WISC-R, the WAIS-R, the Stanford Binet, the McCarthy Scales of Children's Ability. Offered in alternate years.—III. Mundy

215. Research on Achievement Motivation in Education (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing in Education or consent of instructor. Analysis and critique of recent research on cognitive processes related to achievement motivation in school settings. Topics include self-determination theory, attribution theory, goal theory, intrinsic and extrinsic motivation, learned helplessness. psychological reactance, gender and culture, and research design.

220. Concepts and Methods of Policy Analysis (4)
Seminar—3 hours; fieldwork; term paper. Prerequisite: graduate standing. Introduction to concepts and methods of policy analysis. Emphasis on the relationship between educational issues and problems; policy development; constructing persuasive policy analyses; issues related to policy process.—(I.) Timar

221. Culture and Social Organization of Schools (4)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Culture and social organization of schools. Examines perspectives of social researchers, educational policy-makers, and school members and their implications for educational research, policy and practice.

222. School Change and Educational Reform (4)
Lecture/discussion—2 hours; seminar—2 hours. Prerequisite: graduate standing in Education with course 120 or the equivalent. Analysis of models, processes, and case studies of school change and educational reform with respect to variable characteristics of schools and schooling, planned and unplanned change, the moral evaluation of school change, and the role of educational research.

223. Education and Social Policy (4)
Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Focuses on understanding the social and political context of education in the U.S. and California and how education policy is formed in the broader public arena. Develops skills in educational policy analysis. (Former course 237.)

225. Education Policy and Law (4)
Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Examination of law as an instrument of social policy. Specific focus on the legalization of education decision making, its causes, dimensions, and effects on administrative and teacher authority.—Timar

226. Culture and Social Organization of Higher Education (4)
Seminar—3 hours; field work—1 hour. Prerequisite: graduate standing or consent of instructor. Critical study of culture and social organization of higher education institutions policies and functions in the U.S., with some attention to other countries.—Gonzalez

228. Politics and Governance of Education (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Examination of political power, representation, influence, decision-making and intergovernmental relations in the public schools. Offered in alternate years.

229. Education Finance Policy (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Examination of (1) United States financing public education, (2) the relationship between school finance and education policy, and (3) the relationship between education finance and education practice.

230. Special Topics in Education Policy (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Selected topics in education policy. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit when topic differs. Offered irregularly.

235. Critical Pedagogy (4)
Seminar—4 hours. Prerequisite: Critical Theory 200A and graduate standing. A socio-cultural critique, from an interdisciplinary perspective, of educational reform and change. The critique will include an analysis of the influence of text content on the perpetuation of social power differences.—II. Abedi

236. Application of Hierarchical Linear Models in Education Research (4)
Lecture—2 hours; lecture/discussion—2 hours; term paper. Prerequisite: course 204A or similar course with permission of the instructor. Application of hierarchical linear models in education research across multiple areas, such as policy, curriculum, and assessment. Develop working knowledge of hierarchical linear modeling and an understanding of its use in existing research as well as student's work.

237. Survey Research Methods (4)
Lecture/discussion—3 hours; field work—1 hour; term paper. Prerequisite: course 114 or equivalent. Theories, principles and application of survey research methodology. Students develop, validate, and administer survey instruments; select representative samples; conduct focus groups; and collect, organize, and analyze survey data. Familiarity with introductory concepts in descriptive and inferential statistics is assumed. Offered in alternate years.—(II.) Abedi

242. Research on Text Comprehension (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Analysis of recent research related to cognitive processing of written texts. Topics include word decoding, schema theory, background knowledge, assimilation, accommodation, working memory, processing depth, vocabulary acquisition, sentence-level processes, text-level processes, text structure, implications for curriculum and instruction.—Uchikoshi-Tonkovich

243. Research on the Teaching and Learning of Writing (4)
Seminar—4 hours. Prerequisite: graduate standing in Education or consent of instructor. Study of issues in research on composition; history of composition studies; data analysis techniques; product and process approaches; cognitive and social perspectives. Offered in alternate years.

244. Topical Seminar in Language, Literacy and Culture (4)
Seminar—3 hours; project—1 hour. Prerequisite: graduate standing. Critical study of selected issues of language, literacy, and culture as they relate to education. May be repeated two times for credit when topic differs.—II. (II.) Athanases, Uchikoshi, Villalva

245. Theory and Research in Early Literacy (4)
Seminar—3 hours; field work—1 hour. Prerequisite: graduate standing or consent of instructor. Analysis of children's initial processes in learning to read extending from the preschool years into second grade. Topics include emergent literacy, phonological awareness, word recognition, decoding, spelling, vocabulary, comprehension, second language reading, assessment, intervention, and instruction. Offered in alternate years.—III. Uchikoshi

246. Reading as a Social and Cultural Process (4)
Lecture—3 hours; field work—1 hour. Prerequisite: course 211 recommended or consent of instructor. Recent theoretical and empirical work on reading in social contexts. Topics include reading as an individual interactive process; reading as a social and cultural process; critical perspectives on reading; implications of contrastive theoretical perspectives for curriculum and instruction in reading. Offered in alternate years.

247. Research on Response to Culturally Diverse Literature, K-12 (4)
Lecture—3 hours; field work—1 hour. Research on response to culturally diverse literature in classrooms and other K-12 settings. Topics include reader response theories, values in expanding the literary canon, problems of cultural authenticity, resistance to multicultural literature, and instruction for diverse texts and learners. Offered in alternate years.—(II). Athanases

249. Discourse Analysis in Educational Settings (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing and at least one previous course in linguistics or sociolinguistics, or consent of instructor. Examines form and type in discourse (e.g., narration, conversation, routines), approaches to discourse analysis, and research on classroom discourse (lessons, teaching/learning interactional sequences). Final term paper is an analysis of discourse data tape-recorded by student in a field setting.—II. (II.) Watson-Gegeo

251. Research in Bilingual and Second Language Education (3)
Seminar—3 hours. Prerequisite: course 151; knowledge of a foreign language. Discussion and analysis of recent research in bilingual and second language education. Topics include: language acquisition in second language learners and bilinguals, second language teaching methods, language-use models in bilingual education, interaction analysis in bilingual/cross-cultural classrooms, use of the vernacular in classrooms. Merino

252. Multicultural Teaching and Curriculum (3)
Seminar—2 hours; field work—3 hours. Prerequisite: graduate standing or consent of instructor. Cross-cultural research on socialization, motivation, language acquisition and cognition and its application to effective classroom strategies and curriculum development for minority students. Students will develop and implement multicultural curriculum as well as use ethnographic research techniques in an educational setting. Merino

253. Language and Literacy in Linguistic Minorities (3)
Seminar—2 hours; field work—3 hours. Prerequisite: familiarity with another language and culture; graduate standing. Analysis and application of research on oral language development and literacy in language minority students, through the development, implementation, and evaluation of research-based language arts curriculum.—III. (III.) Merino

255. Curriculum Development and Evaluation in Mathematics (4)
Seminar—4 hours. Prerequisite: graduate standing in Education with upper division course work in mathematics or consent of instructor. Analysis of curricular issues and goals in mathematics education, including long-term trends, current status and influences, proposed changes, and evaluation issues. Selected curriculum projects will be examined.—II. Ambrose, White

256A. Research in Mathematics Education (4)
Seminar—4 hours. Prerequisite: graduate standing in Education with upper division course work in mathematics, or consent of instructor. Examination of research process in mathematics education; review of critical productive problems identified by researchers; evolution of trends, issues, theories and hypotheses in various areas of mathematics education research. Course emphasizes foundations. Offered in alternate years.—Ambrose, White

256B. Research in Mathematics Education (4)
Seminar—4 hours. Prerequisite: graduate standing in Education with upper division course work in mathematics, or consent of instructor. Current research issues and activities in mathematics education: status, trends, theories and hypotheses. Formulation of research questions and design of studies. Projection of future directions for research. Offered in alternate years.—III. Ambrose, White

257. Computer Technology in Mathematics Education (4)
Seminar—4 hours. Prerequisite: graduate standing in Education with mathematics course work; or consent of instructor. The roles of calculators, computers, and graphing calculators in mathematics education will be addressed, with emphasis on the impact of these technologies on curriculum reform. Selected efforts to integrate technology into mathematics instruction will be examined. Offered in alternate years.—White

260. The Modern History of Science Education (4)
Seminar—4 hours. Prerequisite: graduate standing in Education with upper division coursework in science, or consent of instructor. History of curricular issues and goals in science education from the late 19th century forward, including long-term trends, current status and influences, proposed changes, and evaluation issues. National science standards and curriculum projects. Offered in alternate years.—II. Passmore

262A. Research Topics in Science Education I (4)
Seminar—4 hours. Prerequisite: graduate standing in Education with upper division coursework in science, or consent of instructor. Research process and product in science education; review of critical science education issues; evolution of trends, theories and hypotheses in various areas of science education research. Survey of current major research in science education. Passmore

262B. Research Topics in Science Education II (4)
Seminar—4 hours. Prerequisite: course 262A and graduate standing in Education with upper division coursework in science. Current research issues and activities in science education: status, trends, theories and hypotheses. Formulation of research questions, design of studies and critical, in-depth review of literature related to the student's research interests.—I. Passmore

264. Scientific Literacy and Science Education Reform (4)
Seminar—4 hours. Prerequisite: graduate standing in Education with upper division coursework in science, or consent of instructor. Current trends in science education reform locally, regionally, and nationally focusing on scientific literacy. Equity, access and "science for all." Offered in alternate years.—III. Ballard, Trexler

270. Research on Teacher Education and Development (4)
Seminar—3 hours; project. Prerequisite: graduate standing. Experience with formal or informal teaching recommended. Research on teacher preparation in university credential programs and on professional development of in-service teachers, with special attention to teacher preparation for work with culturally and linguistically diverse youth.—III. Athanases

271. Supervision of Student Teachers: Research, Theory & Practice (4)
Lecture/discussion—3 hour; fieldwork—1 hour. Prerequisite: graduate standing. Research, theory and practice in the preparation and supervision of teachers. Practice in the supervision of candidates in university teaching credential programs during the student teaching field placement and the mentoring of novice teachers by expert teachers.

275. Effective Teaching (4)
Seminar—4 hours. Review of research on the relationship of effective teacher behavior and student learning. Use of research on teacher effectiveness to develop teaching strategies. Ways to decide on the most appropriate instructional strategies in specific teaching situations.—I, II. (I, II.)

280A. Inquiry and Practice: Qualitative Research for Educational Leaders (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Prepares students to understand the nature/assumptions/logic of qualitative methodology as applied to educational settings, focusing on issues of design/conceptualization/interpretation/application of qualitative research procedures. Students will use these methods in conducting studies in their educational settings.—I. (I.)

280B. Inquiry and Practice: Quantitative Research for Educational Leaders (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Field-based and general quantitative research methods in education will focus this course. Students acquire skills and knowledge to collect, organize, analyze, and interpret univariate and multivariate quantitative data in educational research, dissertation projects, and field-based projects.—II. (II.)

280C. Inquiry and Practice: Research Design and Application for Educational Leaders (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Educational leaders are introduced to qualitative, quantitative, and mixed-methods educational research methods and learn to frame research questions, identify data/data sources, use descriptive statistics, critically examine research studies, make sense of educational research/policy, and conduct independent studies.—III. (III.)

281A. Problem-Based Learning Courses: Part 1 (4)
Lecture/discussion—4 hours; extensive writing or discussion; fieldwork. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students identify problems from their educational settings, engage in data collection/analysis, write-up the process/results, and present to class. Work may become a dissertation proposal, if the problem or its extension is of sufficient interest and value.—I. (I.)

281B. Problem-Based Learning Courses: Part 2 (4)
Lecture/discussion—4 hours; extensive writing or discussion; fieldwork. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Continuation of part one.—II. (II.)

281C. Problem-Based Learning Courses: Part 3 (4)
Lecture/discussion—4 hours; extensive writing or discussion; fieldwork. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Continuation of part two.—III. (III.)

282A. Beginning Issues and Practices: Contemporary Educational Leadership (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students explore the history and emergent relationships among leadership theories/practice and their application to current educational settings. Students will reflect on and refine their personal theory of leadership.—I. (I.)

282A. Beginning Issues and Practices: Diversity Issues for Educational Leaders (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. The diversity of stakeholders and community issues in California schools and colleges will be explored. Emphasis will be placed on the interaction between underrepresented segments of society and educational institutions. Best Practices in leading diverse schools will be explored.—II. (II.)

283A. Advanced Issues and Practices: Leadership Across Communities (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students examine the theory/practice/process of leadership in community-building and collaboration in/across communities, while addressing the utilization of human and material resources and the creation of partnerships, community linkages, and collaborative efforts.—III. (III.)

283B. Advanced Issues and Practices: Leadership and Student Services (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Practical and theoretical perspectives for building a sense of vision to lead the profession of student affairs and to meet the needs of the whole student.—III. (III.)

284A. Policy: History and Theory of Educational Policy (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students learn/analyze the history/theory of educational policy. They see how education leaders have/can positively influence the process and implement effective policies in their local institutions. Policy issues covered: educational opportunity, equity, access, regulation, testing, tenure, accountability.—I. (I.)

284B. Policy: Formulating and Influencing Policy (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students will conduct critical analyses of policy at the federal, judicial, state, regional and local levels. Specific California and federal policy environment structures, processes and people will be examined for intended consequences, ethical dilemmas, social justice and equity issues.—II. (II.)

284C. Policy: Possibilities and Limitations of Educational Policy in a Democracy (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students will critically examine the democratic purposes of education in light of existing National, State, and local policy reform efforts. Questions like, In what ways are these reforms and policies guided by democratic ideas and challenged by those ideals.—II. (II.)

285A. Educational Finance, Human Resources, and Law: Integrated Seminar: Human and Financial Assets: Allocations, and Budgets (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Topics include: education finance theory, contemporary finance policy issues, intergovernmental relations, effective resource management, budget analysis and preparation.—III. (III.)

285B. Educational Finance, Human Resources, and Law: Ethical and Legal Issues in Education (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Human resource and legal concepts and activities governing decisions of school leaders in public education. Attention to theory, application, and practice of personnel and risk management, curriculum, student services, teacher rights, torts, student rights.—I. (I.)

285C. Educational Finance, Human Resources, and Law: Human Resources and Personnel (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Human resource management research and theory and for applying human resource techniques in the educational setting.—III. (III.)

286A. Organizational Structures and Change: Data-Driven Decision-Making for Change (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. Students use and examine multiple sources of information and data and trends found in making quality decisions to improve P-12/community college settings and addressing problems at sites. Students learn limitations of these data sources.—I. (I.)

286B. Organizational Structures and Change: Curriculum & Instruction Issues in Education (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: admission into the CANDEL EdD program or consent of instructor. This course addresses the historical development of various curriculum and instructional methodologies found in public and private schools and colleges, and their impact on current curriculum development and reform efforts at the national, state and local level.—II. (II.)

287. CANDEL Dissertation Seminars (6-12)
Prerequisite: admission into the CANDEL EdD program or consent of instructor. Third year seminars encourage students to complete dissertations within the year. Cohort members meet together in every three-week meetings with faculty members and share their writing, data collection, analysis, discussion of results, development of conclusions/implications. May be repeated nine times for credit until completion of dissertation. (S/U grading only.)—I, II, III. (I, II, III.)

287D. CANDEL Dissertation (6-12)
Prerequisite: passing of qualifying exams in CANDEL program and advancement to candidacy; consent of instructor. Cohort members continue to meet with faculty and share their writing, data collection, analysis, development of conclusions/implications. May be repeated nine times for credit until completion of dissertation. (S/U grading only.)—I, II, III. (I, II, III.)

291. Proseminar in Education (4)
Seminar—3 hours; fieldwork—3 hours. Prerequisite: admission to the Ph.D. graduate program in Education. Professional induction into educational research field and Graduate Group in Education at UC Davis. Introduction to landscape of educational research methodologies, purposes and theories. Analysis of debates within field. Investigation of K-12 educational outreach efforts at UC Davis.—I. (I.) Ambrose

292. Special Topics in Education (2-4)
Variable—2-4 hours. Prerequisite: completion of doctoral core courses in Education or consent of instructor. Selected topics in education. Designed to facilitate preparation for the qualifying examination or dissertation. Students will critically analyze scholarly work including their own works in progress. May be repeated for credit.—(I, II, III.)

298. Group Study (1-5)
(S/U grading only.)

299. Individual Study (1-6)
Independent study—3-18 hours. Individual study under the direction of a faculty member. (S/U grading only.)

299D. Research (1-12)
Independent study—3-36 hours. Research for individual graduate students. (S/U grading only.)

Professional Courses

300. Reading in the Elementary School (4)
Lecture—3 hours; fieldwork—3 hours. Prerequisite: graduate standing. Principles, procedures, and curriculum materials for teaching of reading. Includes decoding skills with a special emphasis on phonics, comprehension skills, study skills, and reading in the content areas.—I. (I.) Galli-Banducci

301. Reading in the Secondary School (4)
Discussion—4 hours. Prerequisite: graduate standing, enrollment in the secondary credential program, or consent of instructor. Principles, procedures, and materials to help secondary school teachers improve the reading competence of students. Strategies for enhancing learning through reading and writing in all disciplines, with special attention to linguistically diverse populations.—I, II. (I, II.)

302. Language Arts in the Elementary School (2)
Lecture—2 hours. Prerequisite: graduate standing. Principles, procedures, and materials for the teaching of oral and written expression, listening skills, drama, and children's literature in elementary schools.

303. Art Education in the Elementary School (2)
Lecture/discussion—2 hours. Prerequisite: admission to multiple subject credential program. Understanding the principles of education in the arts through participation. Development of concepts, introduction to media, and techniques suitable for the elementary school. Curriculum, pedagogy, and materials for teaching the visual and performing arts curriculum in elementary schools.—III. (III.)

304A. Teaching in the Elementary Schools (2-18)
Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular classrooms in elementary schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school achievement of children.—I. (I.)

304B. Teaching in the Elementary Schools (2-18)
Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular classrooms in elementary schools. Current conceptions of elementary school curriculum, emphasis on contributions from the social, biological, and physical sciences. Emphasis on effective teaching methods.—II. (II.)

304C. Teaching in the Elementary Schools (2-18)
Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular classrooms in elementary schools. Evaluation of teaching materials including instructional technology. Current elementary school curriculum with emphasis on contributions from fine arts and humanities.—III. (III.)

305A. Teaching in the Middle Grades (5-8)
Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in middle grades. Current conceptions of the middle-grades curriculum with emphasis on social, biological, and physical sciences. Effective teaching methods.

306A–306B–306C. Teaching in the Secondary Schools (2-18)
Lecture/discussion—2 hours; fieldwork—9-48 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular secondary classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; instructional technology.—I-II-III. (I-II-III.)

307. Methods in Elementary Science (2)
Lecture/discussion—2 hours. Prerequisite: acceptance into teacher education program. Principles, procedures, and materials for teaching the biological and physical sciences in elementary schools.—I. (I.) Passmore

308. Methods in Elementary Social Studies (2)
Lecture/discussion—2 hours. Prerequisite: acceptance into a teacher education program. Principles, procedures, and materials for teaching history and the social sciences in elementary schools.—III. (III.) Rosa

309. The Teaching of Mathematics, K–9 (3)
Lecture/discussion—3 hours. Prerequisite: acceptance into a teacher education program. Mathematics curriculum and teaching methods for K–9 reflecting the needs of California's diverse student populations.—II. (II.) Mendle

322A. Pedagogical Preparation for Secondary Social Science I (3)
Lecture/discussion—2 hours; discussion—1 hour. Prerequisite: acceptance into a teacher education program. Introduction to teaching methods and curriculum approaches for secondary social science teaching. State and national curriculum standards; application of learning theory to effective instruction; interdisciplinary teaching and active learning approaches; effective teaching strategies for English Learners.—I. (I.) Rosa

322B. Pedagogical Preparation for Secondary Social Science II (3)
Lecture/discussion—1 hour; discussion—2 hours. Prerequisite: course 322A. Intermediate teaching methods and curriculum approaches for secondary social science teaching. Interdisciplinary approaches to teaching major themes across social science content areas; teaching potentially controversial social science topics; teaching democratic civic values, student assessment and evaluation.—II. (II.) Rosa

323A. Physical Science in the Secondary School (3)
Laboratory/discussion—2 hours; discussion/laboratory—1 hour. Prerequisite: acceptance into a teacher education program. Activity-based overview of concepts and processes in secondary school physical sciences. Emphasis upon philosophy, appropriate teaching methods, materials, assessment and evaluation of learning.—I. (I.) Passmore

323B. Life Sciences in the Secondary School (3)
Laboratory/discussion—2 hours; discussion/laboratory—1 hour. Prerequisite: acceptance into a teacher education program. Activity-based overview of concepts and processes in secondary school biology and life sciences. Emphasis on philosophy, appropriate teaching methods, materials, assessment and evaluation of learning, and issues.—II. (II.) Pomeroy

324A. Methods and Technology in Secondary Mathematics I (4)
Lecture/discussion—4 hours. Prerequisite: admission into a teacher education program or consent of instructor. Introduction to methods and curriculum for teaching mathematics at the secondary level. Introduction to applications of computer technology as instructional, intellectual, and communication tools for mathematics teachers.—I. (I.) Bellman

324B. Methods and Technology in Secondary Mathematics II (4)
Lecture/discussion—4 hours. Prerequisite: admission into a teacher education program or consent of instructor. Expansion of methods and curriculum for teaching mathematics at the secondary level. Intermediate applications of computer technology as instructional, intellectual, and communication tools in mathematics teaching.—II. (II.) Bellman

325. Research and Methods in Secondary English Language Arts (4)
Discussion—4 hours. Prerequisite: admission to graduate standing or credential program in Education or consent of instructor. Research on teaching and learning in the language arts. Principles, procedures and materials for improving the writing, reading and oral language of secondary students, with special attention to students from culturally and linguistically diverse populations.—I. (I.) Holmes

326. Teaching Language Minority Students in Secondary Schools: Methods and Research (4)
Seminar—3 hours; field work—3 hours. Prerequisite: graduate standing in Education of consent of instructor. Research on principles, procedures and curricula for teaching discipline-specific concepts to language-minority students in secondary schools. Second-language acquisition principles and instructional strategies.

327A. Teaching Methods for Secondary Foreign Language/Spanish, Part I (3)
Lecture—3 hours. Prerequisite: acceptance into a teacher education program or consent of instructor. Introduction to methods for teaching Spanish as a foreign and a heritage language in secondary schools. State and National Standards. Theories on second language acquisition. Lesson plans. Effective teaching strategies and class management. Open to Graduate Teaching Credential students.

327B. Teaching Methods for Secondary Foreign Language/Spanish, Part II (3)
Lecture—3 hours. Prerequisite: course 327A or consent of instructor.Continuation to methods for teaching Spanish as a foreign and a heritage language in secondary schools. Research and practice on foreign and heritage language teaching. Expansion of effective teaching strategies and class management. Open to Graduate Teaching Credential students.

398. Group Study (1-5)
(S/U grading only.)

399. Individual Study (1-5)
(S/U grading only.)

Education (A Graduate Group)

Steven Athanases, Chairperson of the Group

Group Office. 106 School of Education Building (530) 752-7259; Fax (530) 754-6672; *mmreid@ucdavis.edu*

Faculty

Jamal Abedi, Ph.D., Professor *(Education)*
Rebecca C. Ambrose, Ph.D., Associate Professor *(Education)*
Steven Z. Athanases, Ph.D., Professor *(Education)*
Heidi Ballard, Ph.D., Assistant Professor *(Education)*
Robert Bayley, Ph.D., Professor *(Linguistics)*
Angela Booker, Ph.D., Assistant Professor *(Education)*
Brenda Bryant, Ph.D., Professor *(Human Development)*
Scott E. Carrell, Ph.D., Assistant Professor *(Economics)*
Cynthia Carter Ching, Ph.D., Associate Professor *(Education)*
Cecília Colombi, Ph. D., Professor *(Spanish)*
Adela de la Torre, Ph.D., Professor *(Chicano/a Studies)*
Kerry Enright, Ph.D., Assistant Professor *(Education)*
Christian Faltis, Ph.D., Professor, Director of Teacher Education *(Education)*
Barbara Goldman, Ph.D., Associate Director of Teacher Education
Cristina Gonzalez, Professor *(Spanish and Education)*
Joyce Gutstein, Acting Director, Public Service Research Program
Paul Heckman, Ph.D., Professor and Associate Dean *(Education)*
Suad Joseph, Ph.D., Professor *(Anthropology)*
Susan Kaiser, Ph.D., Professor *(Textiles & Clothing, Women and Gender Studies)*
Anna Kato, Ed.D., Lecturer/Supervisor of Teacher Education *(Education)*
Michal Kurlaender, Ed.D., Assistant Professor *(Education)*
Harold Levine, Ph.D., Professor and Dean *(Education)*
Lee Martin, Ph.D., Assistant Professor *(Education)*
Ann Mastergeorge, Ph.D., Developmental and Educational Psychologist *(M.I.N.D. Institute)*; Assistant Adjunct Professor *(Human and Community Development)*
Julia Menard-Warwick, Ph.D., Associate Professor *(Linguistics)*
Barbara J. Merino, Ph.D., Professor *(Education)*
Lisa M. Soederberg Miller, Ph.D., Associate Professor *(Human and Community Development)*
Marco Molinaro, Ph.D., Chief Education Officer, Center for Biophotonics Science and Technology
Peter C. Mundy, Ph.D., Professor *(Education)*
Adrienne Nishina, Ph.D., Assistant Professor *(Human and Community Development)*
Marianne Page, Ph.D., Associate Professor *(Economics)*
Cynthia Passmore, Ph.D., Associate Professor *(Education)*
J. Richard Pomeroy, Ph.D., Lecturer, Supervisor of Teacher Education *(Education)*
Wendell Potter, Ph.D., Senior Lecturer Emeritus *(Physics)*
Refugio Rochin, Ph.D., Professor Emeritus *(Chicano/a) Studies, Agricultural & Resource Economics)*
Gloria Rodriguez, Ph.D., Assistant Professor *(Education)*
Heather M. Rose, Ph.D., Assistant Professor *(Education)*
Tom Sallee, Ph.D., Professor *(Mathematics)*
Julie Schweitzer, Ph.D., Associate Professor *(Psychiatry & Behavioral Sciences);* Director *(ADHD Program, M.I.N.D. Institute)*
Kimberlee A. Shauman, Ph.D., Associate Professor *(Sociology)*
Christopher Thaiss, Ph.D. (*Clark Kerr Presidential Chair and Director, University Writing Program)*

Ross Thompson, Ph.D., Professor *(Psychology)*
Thomas Timar, Ph.D., Professor *(Education)*
Cary Trexler, Ph.D., Associate Professor *(Education)*
Yuuko Uchikoshi Tonkovich, Ed.D., Assistant Professor *(Education)*
Stefano Varese, Ph.D., Professor *(Native American Studies)*
Kenneth Verosub, Ph.D., Professor *(Geology)*
John Wagner, Ph.D., Professor Emeritus *(Education)*
Richard Walters, Professor Emeritus *(Computer Science)*
Karen Watson-Gegeo, Ph.D., Professor *(Education)*
Tobin White, Ph.D., Assistant Professor *(Education)*
Carl Whithaus, Ph.D., Associate Professor *(University Writing Program)*
I. Phillip Young, Ph.D., Professor *(Education)*

Graduate Study. The Graduate Group in Education offers programs of study and research leading to the Ph.D. degree. Students may concentrate in; language, literacy and culture; learning and mind sciences; mathematics education; school organization and educational policy; or science and agriculture education. Students may also combine these fields of study with designated emphasis areas such as Critical Theory; Second Language Acquisition, Women's Studies, and Writing, Rhetoric, and Composition Studies,. Detailed information regarding graduate study may be obtained by writing the Graduate Coordinator or at *http://education.ucdavis.edu/programs/PhDoverview.html*.

Preparation. Students should have earned a Bachelor's or M.A. degree or the equivalent in a discipline relevant to their proposed emphasis program. For example, students applying for the mathematics education emphasis should have earned the B.A. or M.A. or M.A.T. degree in mathematics or mathematics education; students applying to the educational psychology program should have a B.A. or M.A. in psychology or educational psychology.

Graduate Advisers. Jamal Abedi, Rebecca Ambrose, Michal Kurlaender, Lee Martin

Graduate Coordinator. Mary M. Reid

Courses. See School of for courses.

Education Abroad Center

Eric Schroeder, Ph.D., Education Abroad Center Convening Director

Education Abroad Center
207 Third Street, Suite 130
(530) 297-4633; Fax (530) 297-4695;
eacucd@ucdavis.edu;
http://eac.ucdavis.edu

The opportunity to study abroad is one of the richest educational experiences a student can have. When students return from study abroad in places like Italy or Hong Kong, they describe their time abroad as an experience that changed their lives. Students study abroad to see the world, to study their academic interests in a global context, to learn a language, to prepare for a job in the global economy and to add distinction to an application for graduate or professional school.

The Education Abroad Center (EAC) can help students decide which program is best for them, whether to study abroad for a summer, quarter, semester or full year and when to go abroad (freshman through senior years). The EAC Coordinators also participate in freshman seminars, offer financial aid workshops and can advise on programs that have internship opportunities. The EAC also administers the Global and International Studies (GIS) minor, which is sponsored by the Humanities Program in the College of Letters and Science.

The EAC is home to the University of California Education Abroad Program (EAP), to UC Davis Quarter Abroad and to UC Davis Summer Abroad. The EAC coordinates the Non-UC Study Abroad (NUCSA) leave program for students who are interested in participating on non-UC study abroad programs for transfer credit. Finally, the EAC advises and provides student services for international EAP Reciprocity students.

UC Education Abroad Program (EAP)

Charles Lesher, Ph.D., Faculty Director
Education Abroad Center
207 Third Street, Suite 120
(530) 297-4633; Fax (530) 297-4695;
http://eac.ucdavis.edu

The UC Education Abroad Program (EAP) is one of the premiere study abroad programs in the nation. EAP offers international study programs in association with nearly 140 host universities and institutions in some 32 countries around the world. Participating students remain registered at UC Davis while studying abroad and receive full academic credit for their work. EAP students maintain their financial aid and scholarship eligibility while abroad. EAP has study abroad opportunities for undergraduates at all class levels as well as for qualified graduate students who have completed at least one full year of graduate work and have the support of their graduate program and graduate dean.

EAP offers year, semester, quarter, and summer programs for all majors. Over 50% of the programs are offered in English, while several programs allow students to learn a language while experiencing the culture first hand. Some programs include the possibility of internships or field research. In most cases, students attend courses taught by the faculty of the host institution.

UC faculty members serve as directors at most Study Centers abroad, providing in-country academic advising to students during their program. Full UC credit is granted for courses satisfactorily completed, and courses and grades are recorded on official UC transcripts. With careful planning, most EAP students make normal progress toward their UC degrees, even those students who study abroad for a full year. With approval of their major or college advisers, students may earn credit towards their major, minor and general education requirements.

Graduation Requirements. All prospective applicants, particularly students who intend to study abroad during their senior year, should carefully plan their course programs for Davis and abroad in order to satisfy university, college, and major/minor requirements for their degree.

Although units and grade points earned in the EAP are incorporated into the University transcript and GPA, departments and majors retain the right to determine which EAP courses will be accepted in satisfaction of major and minor requirements.

All degree candidates must meet the University residence requirement. Recognizing the special value of study abroad, the faculty have approved two exceptions to the usual residence requirement for students participating in the Education Abroad Program:

- Students planning to graduate immediately upon completion of participation in the EAP may satisfy the University residence requirement by completing at least 35 of their final 45 units on the Davis campus preceding entry into the EAP,

  or

- Students who have not finished all of their degree requirements following completion of their participation in the EAP may satisfy the University residence requirement by completing at least 35 units, including at least 12 units after returning from the EAP, on the Davis campus within the final 90 units earned toward the degree. With this option, as many as 55 units taken abroad may be applied toward the unit requirement for graduation.

Students should consult with their college Dean's office early during the EAP planning process for information on the university residence requirement.

Students may satisfy GE requirements while on EAP, but should consult with the Education Abroad Center and their college Dean's office prior to departure for information on the certification process.

Students may participate in EAP provided that *(1)* they will not exceed 225 units prior to their departure and *(2)* that *all* their degree requirements have been fulfilled either before they leave campus or during their time on EAP. Participants may only return to campus from EAP to complete any outstanding degree requirements provided that they can do so within 225 units.

Participants in programs that conclude in May or June who satisfy all degree requirements while abroad and expect to graduate upon completion of the year abroad should file for candidacy to receive their degree in September; candidacy filing dates are established by the Office of the University Registrar. In most cases, transcripts from abroad may not be received in time to be posted on the student's Davis transcript for EAP returnees to be included on the June degree list. Such returning students may register to participate in the June commencement ceremony; however, their graduation date will be in September. Participants in programs that conclude in November or December should file for candidacy to receive their degree in March. Such returning students may be able register to participate in either the December or subsequent June commencement ceremony. Their graduation date will be in March.

UC Davis Faculty-Led Programs Abroad

UC Davis Quarter Abroad and UC Davis Summer Abroad offer faculty-led study-abroad programs that provide students with unique opportunities to travel and study in over 25 countries. Participants remain registered UC Davis students while abroad and receive UC Davis units for their academic work. Open to students from any major, these programs allow students to choose courses from a wide range of specializations.

Programs range from four-week summer offerings to quarter-long options. All programs allow students to experience the host country's unique culture through co-curricular activities, such as day-trips to surrounding areas, museum tours, and theatre visits.

Financial aid and scholarships apply. Students may participate in Quarter Abroad or Summer Abroad as early as their freshman year, or as late as their senior year. Applicants must have a 2.000 GPA, be in good academic and disciplinary standing, and must fulfill any prerequisites specific to the program courses.

Some courses completed through Quarter Abroad or Summer Abroad can apply specifically towards the Global and International Studies minor. The minor is designed for students who want to create an emphasis on a global topic, including regional, historical, political, ethnic or other issues.

In preparation for Quarter Abroad and/or Summer Abroad, students are urged to take Education Abroad Program 90X or 190X.

UC Davis Quarter Abroad

Yvette Flores, Ph.D., Faculty Director
207 Third Street, Suite 120
(530) 297-4633; Fax (530) 297-4695;
quarterabroad@ucdavis.edu;
http://quarterabroad.ucdavis.edu

Academic Focus. Students can earn 12-22 quarter units through 3-5 courses taken abroad. The UC Davis faculty leader teaches at least one of the courses of the program, while the rest are led by adjunct faculty of the host country. Students may be able to apply earned units towards their major, minor, language, or general education requirements. In addition to language courses or other core courses, select programs also allow students the opportunity to earn units through an internship component.

UC Davis Summer Abroad

Eric Schroeder, Ph.D., Faculty Director
207 Third Street, Suite 220
(530) 757-8308; Fax (530) 297-7142;
summer-abroad@ucdavis.edu;
http://summer-abroad.ucdavis.edu

Academic Focus. Students earn 8 quarter units through two courses taken abroad. All courses are taught by UC Davis faculty with select supplemental lectures provided by local experts. Planned group activities and field trips enhance classroom instruction. Students may be able to apply earned units towards their major, minor, or general education requirements. Programs allow students to complete coursework in English in a wide variety of non-English-speaking locations.

Courses in Education Abroad Program (EAP)

Lower Division Course

90X. International Education Seminar (1)
Seminar—1 hour. Prerequisite: open to lower division applicants for EAP or UC Davis study abroad and international internship programs. Seminar examines the academic, cultural, and personal issues of study abroad, including academic programs abroad, country-specific history and culture, cross-cultural experiences, culture shock, racial and gender issues. May be repeated for credit. (P/NP grading only.)—I, III. (I, III.)

Upper Division Courses

190X. International Education Seminar (1)
Seminar—1 hour. Prerequisite: open to upper division applicants for EAP or UC Davis study abroad and international internship programs. Seminar examines the academic, cultural, and personal issues of study abroad, including academic programs abroad, country-specific history and culture, cross-cultural experiences, culture shock, racial and gender issues. May be repeated for credit. (P/NP grading only.)—I, III. (I, III.)

192. Internship in Education Abroad (1-4)
Internship—3-12 hours. Prerequisite: participation in a study abroad program. Internship related to education abroad. May take place at or away from the university. May be repeated for up to 12 units of credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

Endocrinology (A Graduate Group)

Judith Turgeon, Ph.D., Chairperson of the Group

Group Office. 3301 Tupper Hall;
Human Physiology (530) 752-3230

Faculty

Thomas Adams, Ph.D., Professor *(Animal Science)*
Marylynn Barkley, Ph.D., Associate Professor, Emeritus *(Neurobiology, Physiology, and Behavior)*
Chris Calvert, Ph.D., Professor *(Animal Science)*
Ernest S. Chang, Ph.D., Professor *(Bodega Marine Laboratory)*
Bruce Hammock, Ph.D., Professor *(Entomology)*
Academic Senate Distinguished Teaching Award
Robert Hansen, Ph.D., Professor Emeritus *(Molecular Biosciences)*
Larry Hjelmeland, Ph.D., Professor *(Ophthalmology)*
Bill L. Lasley, Ph.D., Professor Emeritus *(Public Health and Reproduction)*
Stanley Meizel, Ph.D., Professor Emeritus *(Cell Biology and Human Anatomy)*
James R. Millam, Ph.D., Associate Professor *(Animal Science)*
Marty Privalsky, Ph.D., Professor *(Microbiology)*
Jan F. Roser, Ph.D., Professor *(Animal Science)*
Judith Stern, Sc.D., Professor *(Nutrition)*
Dennis M. Styne, M.D., Professor *(Pediatrics)*
Judith L. Turgeon, Ph.D., Professor *(Internal Medicine)*
Donal A. Walsh, Ph.D., Professor Emeritus *(Biological Chemistry)*
Dorothy E. Woolley, Ph.D., Professor Emeritus *(Neurobiology, Physiology, and Behavior)*

Courses in Endocrinology (EDO)

Graduate Courses

220. Endocrinology Literature Critique (1)
Discussion—1 hour. Prerequisite: consent of instructor. Critical reading and evaluation of current original publications in endocrinology. Selected papers will be presented and discussed in detail by faculty and students. May be repeated for credit. (S/U grading only.)—I, II. (I, II.) Turgeon

240. Biochemical Endocrinology (3)
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Examination of recent advances in biochemical endocrinology and molecular and cell biology of endocrine systems with emphasis on processes of hormone and receptor synthesis, second messenger phenomena, and hormonal control of gene expression.—III. (III.) Adams

298. Group Study (1-5)
Prerequisite: consent of instructor.

299. Research (1-12)
(S/U grading only.)

Endocrinology and Metabolism

See Internal Medicine (IMD), on page 396.

Engineering

(College of Engineering)

Bruce R. White, Ph.D., Dean

Bruce Hartsough, Ph.D., Associate Dean-Academic Personnel and Planning

Karen A. McDonald, Ph.D., Associate Dean-Research and Graduate Studies

Jean S. VanderGheynst, Ph.D, Associate Dean-Undergraduate Studies

College Office. 1050 Kemper Hall
(530) 752-1979;
http://engineering.ucdavis.edu
Facebook: UC Davis College of Engineering

Undergraduate Study

The college has eight departments: Applied Science Engineering, Biological and Agricultural Engineering, Biomedical Engineering, Chemical Engineering and Materials Science, Civil and Environmental Engineering, Computer Science Engineering, Electrical and Computer Engineering, Mechanical and Aerospace Engineering.

Graduate Study

Graduate degrees (M.S., M.Engr., Ph.D., D.Engr.) are offered in the following engineering disciplines:

- **Applied Science**
- **Biological Systems Engineering**
- **Biomedical Engineering**
- **Chemical Engineering**
- **Civil and Environmental Engineering**
- **Computer Science**
- **Electrical and Computer Engineering**
- **Materials Science and Engineering**
- **Mechanical and Aeronautical Engineering**
- **Transportation Technology and Policy**

For additional information, refer to http://engineering.ucdavis.edu or the Graduate Study office (530) 752-0592; see also Graduate Studies, on page 109.

The Major Programs

Thirteen majors, leading to the B.S. degree, are open to students.

- **Aerospace Science & Engineering**
- **Biochemical Engineering**
- **Biological Systems Engineering**
- **Biomedical Engineering**
- **Chemical Engineering**
- **Civil Engineering**
- **Computational Applied Science (not accepting new students)**
- **Computer Engineering**
- **Computer Science and Engineering**
- **Electrical Engineering**
- **Electronic Materials Engineering**
- **Materials Science and Engineering**
- **Mechanical Engineering**
- **Optical Science and Engineering**

Two combined majors are offered leading to the B.S. degree:

- **Chemical Engineering/Materials Science and Engineering**
- **Mechanical Engineering/Materials Science and Engineering**

Minor Programs

The College of Engineering offers four undergraduate minors:

- **Construction Engineering and Management (Department of Civil and Environmental Engineering)**
- **Energy Science and Technology (Department of Biological and Agricultural Engineering)**
- **Energy Policy (Department of Biological and Agricultural Engineering)**
- **Optical Science and Engineering (Department of Applied Science)**

Courses in Engineering (ENG)

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

Lower Division Courses

4. Engineering Graphics in Design (3)
Lecture—2 hours; laboratory—3 hours. Engineering design, descriptive geometry, pictorial sketching, computer-aided graphics, and their application in the solution of engineering problems.—I, II. (I, II) Schaaf

6. Engineering Problem Solving (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A, C- or above; Mathematics 16B or 21B (may be taken concurrently). Methodology for solving engineering problems. Engineering computing and visualization based on MATLAB. Engineering examples and applications. GE Credit: SciEng.—I, II, III. (I, II, III.)

7. Technology and Culture of the Internet (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: basic computer experience recommended. Technology and culture of networked computing and the Internet. Topics include the history and development of networked computing; Internet architecture and services; basics of Web page design and hypertext markup language; political, social, cultural, economic and ethical issues related to the Internet. GE credit: SciEng.—II

10. The Science Behind the Technology in Our Lives (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Understanding of how the technology in our lives works using only basic concepts and rudimentary mathematics. GE credit: SciEng, Wrt.—I, II. Baldis, Orel, Parikh

11. Issues in Engineering (1)
Lecture—1 hour. Prerequisite: Participation in the MESA Engineering Program or consent of instructor. Designed to broaden student's understanding of the engineering profession, its methods, principles, design and development process, career opportunities, and professional resources.—I. (I.) VanderGheynst

17. Circuits I (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A, C- or better; Mathematics 22B (may be taken concurrently); Physics 9C, C- or better. Basic electric circuit analysis techniques, including electrical quantities and elements, resistive circuits, transient and steady-state responses of RLC circuits, sinusoidal excitation and phasors, and complex frequency and network functions. GE Credit: SciEng.—I, III. (I, III.)

20. Introduction to Space Exploration: Understanding the Technological and Environmental Challenges to Our Exploration of the Solar System (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: high school level Algebra, Geometry, General Science (Physics and Chemistry). Introductory overview of the space environment. Discussion of space exploration technology including propulsion, orbital mechanics, and spacecraft engineering. GE Credit: SciEng.—III. (III.) Harris

35. Statics (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 9A; Mathematics 21D (may be taken concurrently); Civil and Environmental Engineering 19 or Engineering 6 recommended. Force systems and equilibrium conditions with emphasis on engineering problems.—I, II, III. (I, II, III.)

45. Properties of Materials (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 16C or 21C and Chemistry 2A. Introductory course on the properties of engineering materials and their relation to the internal structure of materials. GE credit: Wrt.—I, II, III. (I, II, III.)

45H. Honors Properties of Materials (1)
Discussion—1 hour. Prerequisite: enrollment in the Materials Science and Engineering Honors Program; concurrent enrollment in course 45 required. Examination of special materials science and engineering topics through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Open only to students in the Materials Science and Engineering Honors program.—II. (II.)

98. Directed Group Study (1-4)
Restricted to College of Engineering students only. (P/NP grading only.) May be repeated for credit up to 3 times.

Upper Division Courses

100. Electronic Circuits and Systems (3)
Laboratory—3 hours; lecture—1 hour; discussion—1 hour. Prerequisite: course 17, C- or better. Introduction to analog and digital circuit and system design through hands on laboratory design projects. Students who have completed Electrical and Computer Engineering 100 may receive only 1.5 units of credit. GE Credit: SciEng.—II, III. (II, III.)

102. Dynamics (4)
Lecture—4 hours. Prerequisite: course 35, Mathematics 22B; open to College of Engineering students only. Kinematics and kinetics of particles, of systems of particles, and of rigid bodies applied to engineering problems. Only 2 units of credit allowed to students who have previously taken Engineering 36.—I, II, III. (I, II, III.) Farouki, Hess, Hull

103. Fluid Mechanics (4)
Lecture—4 hours. Prerequisite: course 102 (may be taken concurrently). Open to majors in hydrology or the College of Engineering. Fluid properties, fluid statics, continuity and linear momentum equations for control volumes, flow of incompressible fluids in pipes, dimensional analysis and boundary-layer flows. Not open for credit to students who have completed Chemical Engineering 150A.—I, II, III. (I, II, III.) Aldredge, Chattot, R. Davis

104. Mechanics of Materials (4)
Lecture—4 hours. Prerequisite: course 35, Mathematics 22B. Open to Engineering majors only. Uniaxial loading and deformation. General concepts of stress-strain-temperature relations and yield criteria. Torsion of shafts. Bending of beams. Deflections due to bending. Introduction to stability and buckling.—I, II, III. (I, II, III.)

104L. Mechanics of Materials Laboratory (1)
Laboratory—3 hours. Prerequisite: course 104. Experiments which illustrate the basic principles and verify the analysis procedures used in the mechanics of materials are performed using the basic tools and techniques of experimental stress analysis.—II, III. (II, III.)

105. Thermodynamics (4)
Lecture—4 hours. Prerequisite: Mathematics 22B and Physics 9B. Open to Engineering majors only. Fundamentals of thermodynamics: heat energy and work, properties of pure substances, First and Second Law for closed and open systems, reversibility, entropy, thermodynamic temperature scales. Applications of thermodynamics to engineering systems.—I, II, III. (I, II, III.) Delplanque, D'Souza, Aldredge

106. Engineering Economics (3)
Lecture—3 hours. Prerequisite: upper division standing in Engineering. The analysis of problems in engineering economy; the selection of alternatives; replacement decisions. Compounding, tax, origins and cost of capital, economic life, and risk and uncertainty are applied to methods of selecting most economic alternatives.—II. (II.) Hartsough, Slaughter

111. Electric Power Equipment (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 17. Principles of AC and DC electric motors and generators, their control systems and power sources. Selection of electric power equipment components based on their construction features and performance characteristics.—I. (II.) Delwiche Hartsough

121. Fluid Power Actuators and Systems (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100, 102, 104 and either 103 or Biological Systems Engineering 103. Hydraulic and pneumatic systems with emphasis on analysis and control of actuators. Design of hydraulic and pneumatic systems, specification and sizing of components, and selection of electro-hydraulics/electro-pneumatics, servo valves, and closed loop systems to solve basic control problems.—(II.) Rosa

122. Introduction to Mechanical Vibrations (4)
Lecture—4 hours. Prerequisite: course 102. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electromechanical analogs; use of energy conservation principles.—I. (I.) Hubbard

160. Environmental Physics and Society (3)
Lecture—3 hours. Prerequisite: Physics 9D, 5C, or 10 or 1B and Mathematics 16B or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (In the College of Engineering, students may receive only one unit of credit towards the Technical Electives requirement.) (Same course as Physics 160.) GE credit: SciEng or SocSci.—I. (I.) Jungerman, Craig

180. Engineering Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: C- or better required in Mathematics 21D, 22B; course 6 or Mechanical Engineering 5. Solutions of systems of linear and nonlinear algebraic equations; approximation methods; solutions of ordinary differential equations; initial and boundary value problems; solutions of partial differential equations of Elliptic, parabolic, and hyperbolic types; Eigen value problems.—I. (I.) Hafez

190. Professional Responsibilities of Engineers (3)
Lecture—3 hours; laboratory—1 hour. Prerequisite: upper division standing. Organization of the engineering profession; introduction to contracts, specifications, business law, patents, and liability; discussion of professional and ethical issues; oral presentations on the interactions between engineering and society.—II, III. (II, III.)

198. Directed Group Study (1-5)
May be repeated for credit up to 3 times. (P/NP grading only.)

Graduate Course

250. Technology Management (3)
Lecture—3 hours. Prerequisite: consent of instructor. Management of the engineering and technology activity. Functions of design, planning, production, marketing, sales, and maintenance. Technological product life cycle. Research and development activity. Project planning and organization. Manufacturing issues. Case studies.—I. (III.)

Engineering: Applied Science

(College of Engineering)

Yin Yeh. Ph.D., Chairperson of the Department

Hector A. Baldis, Ph.D., Vice Chairperson of the Department

Department Office. Engineering III
(530) 752-0360; *http://www.das.ucdavis.edu*

Faculty

Hector A. Baldis, Ph.D., Professor
Stephen P. Cramer, Ph.D., Professor
Yong Duan, Ph.D., Associate Professor
Francois Gygi, Ph.D., Professor
Walter Harris, Ph. D., Professor
David Q. Hwang, Ph.D., Professor
Niels G. Jensen, Ph.D., Professor
Brian H. Kolner, Ph.D., Professor *(Applied Science, Electrical and Computer Engineering)*
Denise M. Krol, Ph.D., Professor
Neville C. Luhmann, Jr., Ph.D., Professor *(Applied Science, Electrical and Computer Engineering)*
Nelson Max, Ph.D., Professor *(Applied Science, Computer Science)*
William McCurdy, Ph.D., Professor *(Applied Science, Chemistry)*
Greg Miller, Ph.D., Professor
Ann E. Orel, Ph.D., Professor
Atul N. Parikh, Ph.D., Associate Professor
David M. Rocke, Ph.D., Professor *(Applied Science, CIPIC)*
Rao Vemuri, Ph.D., Professor *(Applied Science, Computer Science)*
Yin Yeh, Ph.D., Professor

Emeriti Faculty

Berni J. Alder, Ph.D., Professor Emeritus
Meera M. Blattner, Ph.D., Professor Emeritus
Stewart D. Bloom, Ph.D., Professor Emeritus
Richard Christensen, Ph.D., Professor Emeritus
Paul P. Craig, Ph.D., Professor Emeritus
Richard R. Freeman, Ph.D., Professor Emeritus
John S. De Groot, Ph.D., Professor Emeritus
Jonathan P. Heritage, Ph.D., Professor *(Applied Science, Electrical and Computer Engineering)*
William G. Hoover, Ph.D., Professor Emeritus

John Killeen, Ph.D., Professor Emeritus
Richard F. Post, Ph.D., Professor Emeritus
Garry Rodrigue, Ph.D., Professor Emeritus
Wilson K. Talley, Ph.D., Professor Emeritus

Affiliated Faculty

Rod Balhorn, Ph.D., Adjunct Professor
Andrew Canning, Ph.D., Adjunct Professor
James S. Felton, Ph.D., Adjunct Professor

Undergraduate Programs

The Department of Applied Science administers two undergraduate programs: Optical Science and Engineering and Computational Applied Science (Computational Applied Science is not currently open for admission or change of major).

Mission Statement. The mission of the Department of Applied Science is to foster the use of fundamental mathematical and scientific knowledge to improve the quality of life. We provide the profession and academia with outstanding Computational Applied Science and Optical Science and Engineering graduates who advance both engineering practice and fundamental knowledge.

We challenge students to develop attributes that lead to professional growth throughout their careers: a sense of community, ethical responsibility, an expectation for lifelong learning and continuing education, the ability to think independently and perform creatively and effectively in teams, and the ability to communicate effectively both orally and in written media.

Upon graduation, we challenge our students to understand the fundamentals and the application of mathematics and sciences, to have an ability to design, conduct, and understand experiments, as well as to analyze and interpret data; to have a proficiency in the design of components and systems to meet desired performance specifications; an ability to function effectively on multi-disciplinary teams; a proficiency in the use of techniques, skills, and modern engineering tools to identify, formulate, and solve scientific and engineering problems; an understanding of professional and ethical responsibility; a proficiency in oral and written communication; the broad education necessary to understand the impact of engineering solutions in a global and societal context; an ability to engage in graduate education and life-long learning; and a knowledge of contemporary issues that have an impact on society and the profession.

Computational Applied Science Major Program

The Computational Applied Science program is not currently accepting new students.

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

Lower Division Required Courses

	UNITS
Applied Science Engineering 2	4
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22AL-22B	7
Physics 9A-9B-9C-9D	19
Chemistry 2A	5
Engineering 17	4
Computer Science Engineering 30 and 40	8
Computer Science Engineering 20 or 50 or Electrical Engineering 70	4
English 3 or University Writing Program 1 or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
Communication 1 or 3	4
Civil Engineering 19	4
General Education electives	16
Minimum Lower Division Units	**95**

Upper Division Required Courses

Applied Science Engineering 115, 116, 117A, 117B, 117C, 118, 119	31
Statistics 131A or Civil Engineering 114 or Mathematics 131	4
Physics 104A	4
Civil Engineering 119	4
Computational Applied Science electives*	28
Engineering 190	3
General Education electives	8
Unrestricted electives	3
Minimum Upper Division Units	**85**
Minimum Units Required for Major	**180**

Optical Science and Engineering

The Optical Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

Optical Science and Engineering encompasses the physical phenomena and technologies associated with the generation, transmission, manipulation, detection, and applications of light. The Optical Science and Engineering curriculum prepares students to design, analyze, and fabricate effective optical systems. Much of the nation's high-technology infrastructure is based upon optics and its applications, the most prominent being optical digital information transmission. Optical systems play a central role in nearly all aspects of modern life including health care and the life sciences, remote optical sensing, lighting, cameras, space, and national defense.

Students who complete the Optical Science and Engineering curriculum will receive a Bachelor of Science degree in Optical Science and Engineering.

Objectives. Our fundamental program objective is to educate students in the basics required for optical science and engineering: mathematics, sciences, and engineering. We educate students in the fundamentals of the science, analysis, and design of optical systems.

The Optical Science and Engineering Major Program

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

Lower Division Required Courses

	UNITS
Applied Science Engineering 1	4
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C-9D	19
Chemistry 2A	5
Civil Engineering 19 or Computer Science Engineering 30	4
Engineering 17	4
Engineering 45	4
English 3 or University Writing Program 1 or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
Communication 1 or 3	4
General Education electives	16
Total Lower Division Units	**86**

Upper Division Required Courses

Applied Science Engineering 108A, 108B, 108L 115, 161A-B, 165, 166, and 167	36
Electrical and Computer Engineering 130A, 130B, and 135	11
Physics 104A	4
Chemistry 110A	4
Applied Science Engineering 137 or Engineering 190	3
Optics electives	16
16 units from the following: Applied Science Engineering 116, 169, 170, 172; Biological Sciences 102; Chemistry 110B; Electrical and Computer Engineering 100, 133, 136 A-B, 140A, 140B, 150A, 150B	
Technical electives	12
General Education electives	8
Minimum Upper Division Units	**94**
Minimum Units Required for Major	**180**

Optics electives and technical electives should be chosen in consultation with a staff or faculty adviser.

The Minor in Optical Science and Engineering

Minor Requirements:

	UNITS
Applied Science 108A-B, 108L	12
Select 8 units from: Applied Science 115, 165, 167, 169, 170, 172; Electrical and Computer Engineering 130A, 130B, 135; PHY 9D, 104A, 112, 115A, 115B, Chemistry 110A, 110B; Biological Sciences 102	8
Total Units for the Minor	**20**

The Graduate Program in Applied Science

M.S. and Ph.D. in Applied Science
Designated Ph.D. emphasis available in Biophotonics
http://www.das.ucdavis.edu
(530) 754-8858

Graduate students in Applied Science at UC Davis use mathematics and physics to discover new knowledge at the dynamic intersections of engineering, mathematical, physical and biological sciences. Our mission is to advance the leading edge of research and create tools to serve industry, government and society.

We offer unusually rich research opportunities, with a high level of support for graduate students and demonstrated excellence in career prospects following graduation. Nanotechnology and biophotonics are particular areas of interest.

A major strength of the department is its access to the scientists and facilities of the Lawrence Livermore National Laboratory where many of our faculty have joint appointments. Nearly all the students use the laboratory for their thesis research, while the laboratory's facilities are some of the nation's best in atomic and molecular physics, computational physics, fusion technology, laser physics and nonlinear optics, materials science and condensed matter physics, plasma physics and scientific computing.

Generous financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid.

Research Highlights:

- Applied Biosciences & Biotechnology
- Atomic, Molecular and Laser Physics
- Optical Sciences
- Computational Science & Engineering
- Materials Science & Condensed Matter Physics
- Plasma Science & Fusion Engineering
- Computer Visualization and Communications

Research Facilities:

- Lawrence Livermore National Laboratory
- Lawrence Berkeley National Laboratory
- Los Alamos National Laboratory
- High-Power Microwave Source and Plasma Interaction Laboratory
- Far-Infrared and Millimeter Wave Magnetic Fusion Plasma Diagnostics
- Ultrafast Optics and Optoelectronics Facility
- Center for Biophotonics Science and Technology

Complete Information on departmental website.

Courses in Engineering: Applied Science—Davis (EAD)

Lower Division Courses

1. Optical Science and Engineering (4)
Lecture—3 hours; discussion—1 hour. Discussion and demonstrations of optical science and engineering principles and applications. Discussion of the

opportunities and professional practice in the field including ethics and responsibilities.—I. (I.) Baldis, Cramer, Orel

2. Introduction to Applied Computational Science and Engineering (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 21C (may be taken concurrently), Physics 9A (may be taken concurrently), Computer Science Engineering 30. Role of mathematics in modeling physical, biological, and engineering phenomena. Pitfalls in computation. Limitations of models, numerical implementations, and quality assessment of computational data. Interactions among mathematics, algorithms, computer hardware and software, and selected scientific and engineering applications.—III. (III.)

90C. Research Group Conference for Lower Division Students (1)
Discussion—1 hour. Prerequisite: lower division standing; consent of instructor. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

108A. Optics I (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 9C and Mathematics 21D. Optical properties of matter, the nature of light, reflection, refraction, and other properties of light. Basic optical components, reflecting systems, and dispersive components. Geometrical optics, ray tracing, and optical aberrations. Optical instruments. The color of light.—I. (I.) Baldis, Kolner

108B. Optics II (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 108A. Introduction to wave theory of optics, including Maxwell's equations and boundary condition, reflection and transmission coefficients, interference, diffraction, polarization, thin film and ultra thin film optics, and radiation from extended distributions of oscillating electric dipoles. Applications of wave optics. Not open for credit to students who have completed Physics 108 and 108L.—II. (II.) Baldis, Kolner

108L. Optics Laboratory (4)
Discussion—1 hour; laboratory—6 hours; extensive problem solving—3 hours. Prerequisite: courses 108A, 108B. Practical applications of principles of geometrical and physical optics. Optical properties of materials, imaging, lens fabrication, interferometry, polarization, photometry, polarization, diffraction and propagation. Small course fee for materials.—III. (III.) Kolner

115. Numerical Solution of Engineering and Scientific Problems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 6 or Computer Science Engineering 30, and Mathematics 22B. Computer problem solving, including error analysis, roots of equations, systems of equations, interpolation and data fitting, integration; initial value, boundary value, and eigenvalue ordinary differential equations. Emphasis on robust methods to solve realistic problems.—I. II, III. (I, II, III.)

116. Computer Solution of Physical Problems (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 115. Application of computers to the solution of physical problems. Numerical solution of elliptic, parabolic, and hyperbolic partial differential equations. Eigenvalue problems. Monte Carlo methods.—III. Jensen, Cramer, Miller, Orel, Laub, McCurdy, Rodrigue

117A. Simulation and Modeling of Deterministic Dynamical Systems (5)
Lecture—3 hours; laboratory—3 hours; extensive problem solving—3 hours. Prerequisite: course 2, 116; Physics 104A. Numerical techniques for simulation and modeling of nonlinear deterministic systems. Examples from fluid, continuum, molecular mechanics, low dimensional nonlinear systems. Emphasis on error and stability through adaptive methods, evaluation of relationships between physical systems, the model equations, numerical implementation. Jensen, McCurdy, Miller, Orel, Rocke

117B. Simulation and Modeling of Statistical Systems (5)
Lecture—3 hours; laboratory—3 hours; extensive problem solving. Prerequisite: Statistics 131A or Civil and Environmental Engineering 114 or Mathematics 131 and course 117A. Simulation of stochastic systems, maps, and deterministic chaos. Stability and error control in stochastic modeling. Fluctuations and dissipation; dynamics of complex and disordered systems; Monte Carlo techniques, Brownian, Langevin, and molecular dynamics. Simulation of meaningful statistical sampling in stochastic and disordered systems.—II. (II.) Miller, Orel, Laub, McCurdy, Rodrique

117C. Topics in Simulation and Modeling (5)
Lecture—3 hours; laboratory—3 hours; extensive problem solving. Prerequisite: course 117B. Topics may include algorithms in electromagnetics, materials, biology, and economics. Fast multipole and resummation techniques, algorithms for integral transforms, mesh generation, combinatorics, encryption; data mining, handling, and compression of large data sets; optimization.—III. (III.) Miller, Orel, Laub, McCurdy, Rodrigue

118. High Performance Computing (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 117B (may be taken concurrently). Algorithms for efficient scientific computing on modern high-performance computers; influence on algorithms of distributed computing, memory management, networking, and information flow; managing relationships among computer architecture, software, and algorithms.—II. (II.) Miller, Orel, Laub, McCurdy, Rodrigue

119. Applied Computational Linear Algebra (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 115 and Physics 104A. Introduction to computational linear algebra with emphasis on applications in engineered systems; matrix factorizations; mathematical software for fundamental algorithms.—I. (I.) Jensen, Laub

137. Nuclear Power, Weapons, and Proliferation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; one course from Physics 7C, 9C. Scientific and technical aspects of nuclear power production, weapons, and proliferation. Basic topics include fission and chain reactions, fusion and thermo-nuclear reactions, nuclear materials, effects of nuclear arms (delivery, blast, radiation, waste, etc.), and technology related to nuclear non-proliferation. GE Credit: SciEng.—II. (II.) Gygi, Jensen, Orel

161A. Optical Design (4)
Lecture—3 hours; lecture/laboratory—3 hours. Prerequisite: course 108A; senior level standing. Optical materials and design of optical systems. Computer assisted design of optical systems including construction and final system characterization. Knowledge and skills acquired in earlier course work are used for designing that include engineering standards and realistic constraints. (Deferred grading only, pending completion of sequence.)—II. (II.) Baldis

161B. Optical Design (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 108A, 161A (completed during the previous quarter); senior level standing,. Design of a complete optical system, construction, testing, and calibration. The knowledge and skills acquired in earlier course work are used for designing that includes engineering standards and realistic constraints. Knowledge and skills acquired in 161A are essential. (Deferred grading only, pending completion of sequence.)—III. (III.) Baldis

165. Statistical and Quantum Optics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 110A; Electrical and Computer Engineering 130B. Waves and photons; photon number and fluctuations; field and number correlations; atom-photon interactions; line broadening, Einstein coefficients; strong field interactions; photon bunching and anti-bunching; photoelectric counting distributions for chaotic and coherent light; squeezed states.—I. (I.) Yeh

166. Lasers and Nonlinear Optics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 165. Optical gain and amplification, laser threshold conditions, laser pumping requirements and techniques, laser resonator optics, cavity design, specific laser systems, short pulse generation, Q-switching, mode-locking, principles of nonlinear optics, second harmonic generation. optical parametric amplification, electro-optic effect.—II. (II.) Krol, Yeh

167. Fourier Optics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 104A and Electrical and Computer Engineering 130B. Linear systems analysis of two-dimensional optical systems, 2D Fourier transforms, scalar diffraction theory, Fresnel and Fraunhofer diffraction, coherent and incoherent optical systems, spatial frequency analysis, analog optical information processing, spatial light modulators, film, holography, character recognition, and image restoration.—II. (II.) Kolner, Orel, Jensen

169. Optical Properties of Materials (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 108B, Engineering 45, and Chemistry 110A. Relation between structure, composition, and optical properties of laser materials, nonlinear optical materials, photorefractives, fiber optics, semiconductors, liquid crystals, and thin films.—III. (III.) Krol, Parikh

170. Optical Spectroscopy: Concepts and Instrumentation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 110A and course 166. Fundamentals of absorption and emission, spectrometers, interferometers, light sources and detectors, UV, Visible, and IR spectroscopy, fluorescence spectroscopy, Raman and Brillouin scattering, high-resolution laser spectroscopy.—III. (III.) Orel, Kolner, Yeh, Parikh

172. Optical Methods for Biological Research (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 108B, Biological Sciences 2A, and Chemistry 110A. Optical techniques for resolving significant research problems in biology. Examples include the sequence, structure, and movement of DNA; nuclear organization and DNA replication; channel transport; membrane receptor sites and cell fusion; protein-protein interactions and supramolecular organization.—III. (III.) Yeh

188. Science and Technology of Sustainable Power Generation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: upper-division standing, Physics 7C or 9C. Focus on scientific understanding and development of power generation that is the basis of modern society. Concentration on power generation methods that are sustainable, in particular, discussion of the most recent innovations. GE Credit: SocSci.—II. (II.) Hwang

190C. Research Group Conference for Advanced Undergraduates (1)
Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in applied science. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship (1-5)
Internship—3-36 hours. Prerequisite: consent of instructor; upper division standing; approval of project prior to the period of the internship. Supervised work experience in Optical Science Engineering or Computational Applied Science. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

205A. Mathematical Methods (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22B or equivalent. Complex variables, theory of convergence, evaluation of definite integrals, factorial function (gamma function), solution of second-order ODEs, Fourier analysis.—I. (I.) Jensen, Miller, Orel, Rodrique

205B. Mathematical Methods (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 205A. Laplace transforms, Fourier transforms, Delta sequences, Direct solution of PDEs, Green's functions for PDEs.—II. (II.) Jensen, Miller, Orel, Rodrique

205C. Mathematical Methods (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A and 22B or equivalent. Spherical harmonics, Bessel functions, special functions, finite and infinite vector spaces.—I. (I.) Jensen, Miller, Orel

209. Linear Modeling Techniques (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 167 or the equivalent strongly recommended. Matrix theory and linear algebra with emphasis on applications in engineered systems; geometric aspects of linear algebra; matrix factorizations; analysis and design techniques for discrete- and continuous-time lumped parameter models.—I. (I.) Laub

210A. Numerical Methods in Applied Science (4)
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: facility with a programming language; C or C++ strongly recommended. Numerical methods developed from an applied mathematics perspective: Analysis and control of numerical error, interpolation, integration, noniterative solution of linear systems, iterative methods for root finding and minimization.—II. (II.) Rodrigue, Miller, Jensen

210B. Numerical Methods in Applied Science (4)
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: facility with a programming language; C or C++ strongly recommended. Numerical methods developed from an applied mathematics prespective: Iterative methods for linear systems, numerical solutions for ODE initial and boundary value problems, numerical PDEs, eigenvalues and eigenvectors.—III. (III.) Rodrigue, Miller, Jensen

210C. Numerical Methods in Applied Science (3)
Lecture—3 hours. Prerequisite: course 210B. Computational methods in various fields including: fluid mechanics, kinetic theory, solid mechanics, quantum mechanics.—I. (I.) Rodrigue, Vemuri

211A. Numerical Solution of Partial Differential Equations I (3)
Lecture—3 hours. Prerequisite: course 210A, 210B. Fundamentals of parallel computers, grid generation, domain decomposition, Poisson's equation, elliptic PDEs, Galerkin methods, numerical linear algebra, iterative acceleration.—I. (I.) Rodrigue, Miller, Orel, Jensen

211B. Numerical Solution of Partial Differential Equations II (3)
Lecture—3 hours. Prerequisite: course 211A. Parabolic PDEs, stability, preconditioned time differencing, hyperbolic PDEs, modified differential equation, advection-diffusion equations, wave equation, Burgers' equation, reaction-diffusion equations.—II. (II.) Rodrigue, Miller, Orel, Jensen

211C. Numerical Solution of Partial Differential Equations III (3)
Lecture—3 hours. Prerequisite: course 211B. Conservation laws, fluid equations, turbulence, elasticity equations, electromagnetic equations, transport equations.—III. (III.) Rodrigue, Miller, Orel, Jensen

213A. Computer Graphics (3)
Lecture—3 hours. Prerequisite: consent of instructor. Development of algorithms for perspective line drawings of three-dimensional objects, as defined by polygons or bicubic patches.—(II.) Max

217A. Applied Computational Science (3)
Lecture—3 hours. Prerequisite: course 210A, Mathematics 229A or the equivalent (may be taken concurrently). Applied modular programming in low level language (c or fortran). Direct implementations and integrated applications of algorithms applied to computational science problems, which are exemplified through projects. Emphasis on the practical use and implementation of theory taught in course 210A.—I. Rodrique, Miller, Orel, Jensen

217B. Applied Computational Science (3)
Lecture—3 hours. Prerequisite: course 210B or the equivalent (may be taken concurrently). Applied modular programming in low level language (c or fortran). Direct implementations of the theory taught in course 210B and integrated applications of algorithms for computational science problems, exemplified through projects including partial differential equations; initial/boundary value problems.—II. Rodrique, Miller, Orel, Jensen

218. Signal Processing (3)
Lecture—3 hours. Prerequisite: Mathematics 121A, 121B or the equivalent. Discrete-time and continuous-time signal processing. Fourier transforms, Laplace transforms, sampling and reconstruction. LTI systems: convolution. Discrete-time transforms: DFT, FFT, and Discrete wavelet transforms. Filters and filter designs.—I. (I.) Dowla

219. Wavelets and Their Applications (3)
Lecture—3 hours. Prerequisite: Electrical and Computer Engineering 150A, Mathematics 167. Fourier transforms and digital filters; sampling theorem and analog-to-digital conversion, multirate signal processing; wavelet transforms and filter banks; fast algorithms: FFT, DWT, and pyramid; data compression with wavelets; spectral factorization; designing application-specific wavelets. Offered in alternate years.—(II.) Dowla

220A. Artificial Neural Nets–I (3)
Lecture—3 hours. Prerequisite: Mathematics 167; ability to use computers to solve problems using a traditional language or via tools like Matlab or Mathematica. Biological and Computational motivations. Models of neurons. Supervised and unsupervised learning. Correlation matrix memories. Discrete and continuous Hopfield nets. Self organization. Kohonen Net. Counter propagation. Perceptron. LMS methods. Back propagation. Offered in alternate years.—(I.) Vemuri

220B. Artificial Neural Nets–II (3)
Lecture—3 hours. Prerequisite: course 220A. Growing and pruning algorithms for multi-layer perceptrons, acceleration of convergence, conjugate gradient methods. RBF networks. Temporal processing. Modular networks. Reinforcement learning. Neurodynamics. Case studies. Offered in alternate years.—(II.) Vemuri

221. Genetic Algorithms and Optimization (3)
Lecture—3 hours. Prerequisite: Mathematics 145 or the equivalent; graduate standing; ability to program in one of the modern programming languages. Introduction to genetic algorithms. Fundamental theorem; schema processing; genetic operators; applications to function optimization, scheduling, VLSI circuit layout. Implementation on parallel computers; genetic programming; evolutionary algorithms.—(III.) Vemuri

225. Computational Structures for Signal and Image Processing and Graphics (3)
Lecture—3 hours. Prerequisite: Computer Science Engineering 40; course 210A. Tools for research in digital media. Relevant computer architectures, algorithms and languages for signal processing, image processing and graphics. Hardware and software issues in parallelism. Programming in SISAL. Parallel C and Parallel Fortran. Parallel algorithms using SISAL on parallel computers. Offered in alternate years.—(III.) Vemuri

226. Practical Data Communications in Digital Media (3)
Lecture—3 hours. Prerequisite: Computer Science Engineering 152. Tools for research in digital media. Communication protocols, algorithms and architectures suitable in modern networked environment. Transmission of digital data over voice-grade channels, telecommunications networks for data transport, Broadband multimedia communications, ATM, and Broadband ISDN. Offered in alternate years.—(II.) Vemuri

228A-228B-228C. Properties of Matter (3-3-3)
Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.—I, II, III. (I, II, III.) Luhmann, Yeh, Baldis, McCurdy

229. Computational Molecular Modeling (4)
Lecture—3 hours; project. Prerequisite: course 210A and 228A or consent of instructor. Theory and hands-on implementation of algorithm in computational statistical mechanics. Temporal integrators, molecular dynamics, force fields, constrained dynamics, Monte Carlo techniques, fluctuation-dissipation theorem, and parallel vs. serial computing.—II. (II.) Jensen

230. Topics in Computational Fluid Dynamics (3)
Lecture—3 hours. Prerequisite: course 210A, 210B or consent of instructor. A hands-on approach to numerical methods for compressible fluid flow. Readings and discussions of solution strategies complemented with programming exercises and projects to give first hand experience with performance and accuracy of several computational methods; from upwind differencing to Godunov methods.—III. (III.) Miller

231A. Applied Quantum Mechanics (3)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 205ABC (may be taken concurrently). Classical properties of matter; introduction to quantum mechanics by the correspondence principle. Solvable bound state/continuum problems in 1-D: well, barrier, and harmonic oscillator. Solvable problems in 3-D: HO, well, and hydrogen atom. Matrix theory: Schroedinger, Heisenberg, and interaction pictures.—II. (II.) Orel, Krol, Yeh

231B. Applied Quantum Mechanics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 231A. Approximate methods in quantum

233A-233B-233C. Theory and Applications of Solid-State Physics (3-3-3)
Lecture—3 hours. Prerequisite: course 230C or the equivalent. Structure and properties of crystals; theory of dielectrics, metals and alloys; magnetism, superconductivity, and semiconductors. Applications to various solid-state devices.—I-II-III. (I-II-III.) Orel

234A. Applied Electromagnetics I (3)
Lecture—3 hours. Prerequisite: Electrical and Computer Engineering 130B or the equivalent. Electrostatics; Gauss's law, potentials, fields, boundary value problems, multiple pole expansions, dielectrics, polarization, capacitance, energy, torque, forces, eigenfunction expansions. Magnostatics; Biot-Savart law, Ampere's law, vector potential, gauge transformations, magnetization, inductance, constitutive relations.—II. (II.) Kolner, Hwang

234B. Applied Electromagnetics II (3)
Lecture—3 hours. Prerequisite: course 234A. Maxwell's Equations, wave equations for fields and potentials. Poynting's Theorem and power flow. Momentum and angular momentum in the electromagnetic field. Stress tensor. Polarization. Reflection/refraction. Dispersion, causality, and susceptibility. Circuit concepts, radiation.—III. (III.) Kolner, Hwang

234C. Applied Electromagnetics III (3)
Lecture—3 hours. Prerequisite: course 234B. Dynamics of relativistic particles; collisions between charged particles, energy loss, and scattering; radiation by moving particles; bremsstrahung, method of virtual quanta, radiative beta processes; multipole fields; radiation damping, self fields of a particle, scattering and absorption of radiation.—I. (I.) Kolner, Hwang

262A. Atomic and Molecular Interactions (3)
Lecture—3 hours. Prerequisite: Physics 215A-215B-215C or the equivalent. Atomic structure and spectra. Offered in alternate years.—(I.) Orel

262B. Atomic and Molecular Interactions (3)
Lecture—3 hours. Prerequisite: Physics 215A-215B-215C. Molecular structure and spectra. Offered in alternate years.—(II.) Orel

262C. Atomic and Molecular Interactions (3)
Lecture—3 hours. Prerequisite: course 262B. Classical and quantum mechanical collision theory of electron and heavy particle scattering. Offered in alternate years.—(III.) Orel

263A. Quantum Statistics of Light (3)
Lecture—3 hours. Prerequisite: Physics 200B-200C and Physics 215A-215B-215C or the equivalent. Classical susceptibilities, single quantization of light/matter interactions, resonance phenomena, second quantization of electromagnetic fields, number representation and operators.—II. (II.) Orel, McCurdy

263B. Quantum Theory of Optics (3)
Lecture—3 hours. Prerequisite: course 263A. Statistics of photon fluctuations. Quantum theory of radiation. Theory of lasers.—III. (III.) Orel

264A. Classical Optics I (3)
Lecture—3 hours. Prerequisite: course 108B and Electrical and Computer Engineering 130B or Physics 110B. Crystal optics; anisotropic wave propagation, dispersion relations, phase and group velocity surfaces. Polarization, Stokes parameters, Poincare sphere. Optical crystallography; interference figures, optical activity, crystal symmetry and point groups. Piezoelectricity, electro-optic, magneto-optic effects. Geometrical optics; eikonal equation, Lagrange's integral invariant, Fermat's principle.—I. (I.) Kolner

264B. Classical Optics II (3)
Lecture—3 hours. Prerequisite: course 264A. Dielectric waveguide theory; slab waveguides, integrated optics waveguides, optical fibers. Guided, radiation, and leaky-wave modes. Dispersion, compensation, and communications bit rates. Coupled-mode theory, waveguide perturbations, directional couplers, fiber gratings. Dielectric microcavities. Self- and cross-phase modulation. Solitons.—II. (II.) Kolner

264C. Classical Optics III (3)
Lecture—3 hours. Prerequisite: course 264B. Huygens-Fresnel principle, Kirchoff's diffraction theory. Fresnel and Fraunhofer diffraction. Phase and amplitude gratings, aperatures, lenses, two-dimensional linear systems. Spatial filtering. Holography. Coherence theory; spatial/temporal coherence, partial coherence, mutual intensity, degree of coherence, van Cittert-Zernike theorem, coherency matrix.—III. (III.) Kolner

265A. Laser Physics I (3)
Lecture—3 hours. Prerequisite: Physics 200C and Physics 215B-215C or the equivalent. Classical theory of lasers. Classical electron oscillator, atomic susceptibility, line broadening mechanisms, rate equations, stimulated transitions, radiative/nonradiative relaxations, multilevel systems, population inversion, saturation, oscillation, Schawlow-Townes limit, paraxial wave propagation, dispersion, pulse compression, resonators, modes, stability, Q-switching, modelocking.—I. (I.) Kolner

265B. Laser Physics II (3)
Lecture—3 hours. Prerequisite: course 265A. Beam propagation, resonators and laser dynamics. Threshold dynamics and cavity modes. Ray optics and matrices, wave optics and Gaussian beams. Resonator stability. Linear pulse propagation, dispersion and pulse compression. Spiking, relaxation, Q-switching, injection locking and modelocking.—II. (II.) Kolner

267. Nonlinear Optics (3)
Lecture—3 hours. Prerequisite: course 265A-265B. Theory of the nonlinear interaction of radiation and matter. Nonlinear optical properties of materials. Crystal optics, electro-optics, and acousto-optics. Parametric oscillation and amplification. Harmonic conversion. Stimulated Raman and Brillouin scattering, self-focusing, four-wave mixing, phase conjugation and spectroscopy.—III. (III.) Krol

270A-270B. Advanced Laser Plasma Physics (3)
Lecture—3 hours. Prerequisite: course 205A, 205B, 234. Laser-produced plasmas and advanced applications of high power lasers. Plasma formation with lasers, ponderomotive force, kinetic theory, waves in unmagnetized plasmas, non-linear effects, parametric instabilities, hydrodynamic instabilities, and radiation transport. Applications include ICF, X-ray lasers.—II-III. (II-III.) Baldis

271. Optical Methods in Biophysics (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 102 or the equivalent, course 108B or the equivalent, and Chemistry 110A or the equivalent. Principal optical techniques used to study biological structures and their related functions. Specific optical techniques useful in the studies of protein-nucleic acid, protein-membrane and protein-protein interactions. Biomedical applications of optical techniques. (Same course as Biophysics 271.)—III. (III.) Yeh, Parikh, Balhorn, Matthews

273. X-Ray Spectroscopy and Synchroton Radiation (4)
Lecture—3 hours; discussion—1 hour. Fundamentals of x-ray absorption, emission, and inelastic scattering; x-ray imaging and microscopy; synchroton radiation from bend magnets, wigglers, undulators, and free electron lasers; x-ray optics and storage ring design; visits to the synchroton radiation facilities SSRL and ALS; optional experiments. Offered in alternate years.—III. Cramer

280A-280B-280C. Plasma Physics and Controlled Fusion (3-3-3)
Lecture—3 hours. Prerequisite: course 234B or consent of instructor. Equilibrium plasma properties; single particle motion; fluid equations; waves and instabilities in a fluid plasma; plasma kinetic theory and transport coefficients; linear and nonlinear Vlasov theory; fluctuations, correlations and radiation; inertial and magnetic confinement systems in controlled fusion.—I, II, III. (I, II, III.) Luhmann, Hwang

285A. Physics and Technology of Microwave Vacuum Electron Beam Devices I (4)
Lecture—4 hours. Prerequisite: B.S. degree in physics or electrical engineering or the equivalent background. Physics and technology of electron beam emissions, flow and transport, electron gun design, space charge waves and klystrons. Offered in alternate years.—(III.) Luhmann

285B. Physics and Technology of Microwave Vacuum Electron Beam Devices II (4)
Lecture—4 hours. Prerequisite: 285A. Theory and experimental design of traveling wave tubes, backward wave oscillators, and extended interaction oscillators. Offered in alternate years.—(I.) Luhmann

285C. Physics and Technology of Microwave Vacuum Electron Beam Devices III (4)
Lecture—4 hours. Prerequisite: 285B. Physics and technology of gyrotrons, gyro-amplifiers, free electron lasers, magnetrons, crossfield amplifiers and relativistic devices. Offered in alternate years.—(II.) Luhmann

285D. Physics and Technology of Microwave Vacuum Electron Beam Devices IV (4)
Lecture—4 hours. Prerequisite: 285C. Computational models of vacuum electron beam devices. Offered in alternate years.—(III.) Luhmann

289A-N. Special Topics in Applied Science (1-5)
Lecture, laboratory, or combination. Prerequisite: graduate standing or permission of instructor. Special topics in the following areas: (A) Atomic, Molecular, and Optical Physics; (B) Chemical Physics; (C) Computational Physics; (D) Biophotonics/Biotechnology; (E) Materials Science; (F) Imaging Science and Photonics; (G) Nonlinear Optics; (H) Plasma/Fusion Energy Physics; (I) Quantum Electronics; (J) Condensed Matter/Statistical Physics; (K) Classical Optics; (L) Microwave and Millimeter-Wave Technology; (M) Synchrotron Radiation Science; (N) Space Physics. May be repeated for credit up to a total of five units per segment when topic differs.—I, II, III. (I, II, III.)

290. Seminar (1-2)
Seminar—1-2 hours. (S/U grading only.)

290C. Graduate Research Group Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Course in Biophotonics (BPT)

Graduate Course

280. Biophotonics Internship (7-12)
Internship—36 hours. Prerequisite: graduate standing; consent of instructor. Open only to students in the designated emphasis in Biophotonics. Research experience distinct from the student's dissertation topic at an industrial company, a national laboratory, or a cross-college laboratory for one quarter. (S/U grading only.)—I, II, III. (I, II, III.)

290. Biophotonics Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Presentation of current research in the area of biophotonics by experts in the field, followed by group discussions. May be repeated up to three times for credit. (S/U grading only.)—I, II, III (I, II, III.) Yeh

Engineering: Biological and Agricultural

(College of Engineering)

Michael J. Delwiche, Ph.D., Chairperson of the Department

Department Office. 2030 Bainer Hall
(530) 752-0102;
http://bae.engineering.ucdavis.edu

Faculty

Michael J. Delwiche, Ph.D., Professor
Julia Fan, Ph.D., Assistant Professor
Fadi A. Fathallah, Ph.D., Professor
D. Ken Giles, Ph.D., Professor
Mark E. Grismer, Ph.D., Professor
(Land, Air and Water Resources)
Bruce R. Hartsough, Ph.D., Professor
Bryan M. Jenkins, Ph.D., Professor
Tina Jeoh, Ph.D., Assistant Professor
John M. Krochta, Ph.D., Professor
(Food Science and Technology)
Kathryn McCarthy, Ph.D., Professor
(Food Science and Technology)
Michael J. McCarthy, Ph.D., Professor
(Food Science and Technology)
Nitin Nitin, Ph.D., Assistant Professor
(Food Science and Technology)
Ning Pan, Ph.D., Professor *(Textiles and Clothing)*
Raul H. Piedrahita, Ph.D., Professor
Richard E. Plant, Ph.D., Professor *(Plant Sciences)*
Uriel Rosa, Ph.D., Assistant Professor
R. Paul Singh, Ph.D., Professor
David C. Slaughter, Ph.D., Professor
Shrinivasa K. Upadhyaya, Ph.D., Professor
Jean S. VanderGheynst, Ph.D., Professor
Wesley W. Wallender, Ph.D., Professor
(Land, Air and Water Resources)
Ruihong Zhang, Ph.D., Professor

Emeriti Faculty

Norman B. Akesson, M.S., Professor Emeritus
Robert H. Burgy, M.S., Professor Emeritus
William J. Chancellor, Ph.D., Professor Emeritus
Pictiaw (Paul) Chen, Ph.D., Professor Emeritus
Roger E. Garrett, Ph.D., Professor Emeritus
John R. Goss, M.S., Professor Emeritus
David J. Hills, Ph.D., Professor Emeritus
Miguel Mariño, Ph.D., Professor Emeritus
R. Larry Merson, Ph.D., Professor Emeritus
John A. Miles, Ph.D., Professor Emeritus
Stanton R. Morrison, Ph.D., Professor Emeritus
James W. Rumsey, M.S., Senior Lecturer Emeritus
Thomas A. Rumsey, Ph.D., Professor Emeritus
Verne H. Scott, Ph.D., Professor Emeritus
Henry E. Studer, M.S., Professor Emeritus
Wesley E. Yates, M.S., Professor Emeritus

Affiliated Faculty

Daniel Downey, Ph.D., Assistant Research Engineer
Dennis R. Heldman, Ph.D., Adjunct Professor
Zhongli Pan, Ph.D., Adjunct Assistant Professor
Herbert B. Scher, Ph.D., Research Engineer
James F. Thompson, M.S., Extension Specialist

Mission. The Department of Biological and Agricultural Engineering is dedicated to the advancement of engineering for biological systems. Specifically, our goals are to advance the science, teach the principles and application, and disseminate the knowledge of engineering needed to efficiently produce, distribute, and process biological products, such as food, feed, and fiber, while conserving natural resources, preserving environmental quality, and ensuring the health and safety of people.

Objectives. We educate students in the fundamentals of mathematics, physical and biological sciences, and engineering, balanced with the application of principles to practical problems. We teach students to develop skills for solving engineering problems in biological systems through use of appropriate analysis, synthesis, and engineering design techniques. We prepare students for entry into engineering practice and graduate education, as well as engagement in life-long learning. We foster the ability of our students to collaborate and communicate effectively, and provide an awareness of the importance of economics, professional responsibility, and the environment.

The Biological Systems Engineering Undergraduate Program

Biological Systems Engineering is an engineering major that uses biology as its main scientific base. In the new age of biology and biotechnology, engineers are needed to work side by side with life scientists to bring laboratory developments into commercial production. Industries in plant and animal production, bioenergy, bioprocessing, biotechnology, food processing, aquaculture, agriculture, and forest production all need engineers with strong training in biology. Concern for the use and preservation of environmental resources creates many engineering opportunities as society strives to maintain a balance within the biosphere.

In the freshman and sophomore years, the Biological Systems Engineering major requires sequences of courses standard in all engineering programs, including mathematics, physics, chemistry, engineering science, and humanities. In addition, the Biological Systems Engineering major also requires courses in the biological sciences. In the junior and senior years, core courses are taken involving the integration of engineering with biology.

Biological Systems Engineering Program

The Biological Systems Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C	15
Chemistry 2A-2B	10
Biological Sciences 2A-2B-2C	14
Biological Systems Engineering 1	4
Engineering 6, 35, 17	11
Biological Systems Engineering 75	4
University Writing Program 1	4
Communication 1 or 3	4
General Education electives	8
Minimum Lower Division Units	**96**

Upper Division Requirements:

In the junior and senior years, the Biological Systems Engineering major requires courses that focus on the integration of biology and physical sciences with engineering. Depending on your area of interest, you may select elective courses from seven specializations:

Agricultural Engineering

Aquacultural Engineering

Bioenergy Engineering

Biomechanics/Premedicine/Preveterinary Medicine

Biotechnical Engineering

Ecological Systems Engineering

Food Engineering

Forest Engineering

You may also develop your own specialization in consultation with your adviser. The upper division requirements are listed following the areas of specialization.

Areas of Specialization

Agricultural Engineering. Students specializing in agricultural engineering integrate analysis and design with applied biology to solve problems in producing, transporting and processing agricultural products leading to food, fiber, energy, pharmaceuticals and other human needs. Agricultural engineers design machinery, processes, and systems for productive plant and animal culture, including managing nutrients and waste while minimizing adverse environmental effects. The recommended electives provide students with the fundamental principles of agricultural production and a broad background in engineering. Agricultural engineers are employed as practicing professionals and managers with agricultural producers, equipment manufacturers, food processors, consulting engineering firms, start-up companies and government agencies.

Recommended biological science electives:

Plant Emphasis

Plant Biology 111
Soil Science 100
Select one course from Agricultural Management and Rangeland Resources 110A, Entomology 100, Plant Sciences 114, Environmental Horticulture 102

Animal Emphasis

Neurobiology, Physiology, and Behavior 101
Soil Science 100
Select one course from Avian Sciences 100, Animal Science 143, 144, 146

Recommended engineering electives:

Biological Systems Engineering 114, 145
Civil and Environmental Engineering 141, 141L
Engineering 180

Suggested Advisers: M. Delwiche, J. Fan, K. Giles, M. Grismer, D. Hills, B. Jenkins, D. Slaughter, S. Upadhyaya, W. Wallender, R. Zhang

Aquacultural Engineering. Aquacultural engineers design, build, and manage equipment and systems for the production of aquatic plants and animals. Aquacultural engineers must have a solid understanding of biology and processes related to water quality to work with the wide variety of systems used for aquaculture production. Systems range from sophisticated indoor operations with water treatment and recirculation to low-input earthen ponds. Employment opportunities for aquacultural engineers include engineering consulting companies and government agencies. The aquaculture industry is expanding rapidly in various areas around the world, creating international employment opportunities for aquacultural engineers.

Recommended biological science electives:

Animal Science 118, 131, 136
Wildlife, Fish, and Conservation Biology 120, 121

Recommended engineering electives:

Civil and Environmental Engineering 140, 140L, 141, 141L, 148A, 148B
Suggested adviser: R. Piedrahita

Suggested adviser: R. Piedrahita

Bioenergy. Specialization in bioenergy is for students interested in the production of energy from renewable biological resources. The area of bioenergy requires discovery, development and dissemination of new mechanisms and processes for the sustainable production and use of biological materials from plants and microbes. To obtain training in the area, the core engineering and biology courses in the Biological Systems Engineering major are coupled with electives in environmental chemistry, thermal and power systems, life-cycle analysis, plant molecular biology, and plant production. Biological engineers specializing in bioenergy will be needed in the future to work within industrial, government, and academic settings to expand the current sources of energy available in the U.S. and around the world.

Recommended biological science electives:

Biological Sciences 101, 103
Microbiology 102
Plant Biology 113
Plant Sciences 101, 142

Recommended engineering electives:

Biological Systems Engineering 162
Civil and Environmental Engineering 143, 148A, 149, 150, 153
Mechanical Engineering 161, 162, 163

Suggested advisers: J. Fan, B. Hartsough, B. Jenkins, T. Jeoh, J. VanderGheynst, R. Zhang

Biomechanics/Pre-Medicine/Pre-Veterinary Medicine. This specialization is for students interested in the biomechanics of humans and animals, with emphasis on the physical, chemical, and biological factors affecting motion and function. Combined training in mechanics, material properties, and ergonomics allows graduates to work in industry on the design, evaluation, and application of medical devices and systems as well as worker health and safety. Some students use the specialization as preparation for medical or veterinary school with the assurance of a marketable degree in engineering in case their post-graduation plans change. The Biomechanics specialization is also excellent preparation for graduate work in biomedical engineering. Students interested in medical or veterinary school should consult with admissions advisers from the appropriate school to plan for successful admission, including necessary summer experience.

Recommended Biological Science Electives:

Biological Sciences 102
Neurobiology, Physiology and Behavior 101
Exercise Biology 103
Cell Biology and Human Anatomy 101
Recommended Engineering Electives:
Biological Systems Engineering 128, 175
Biomedical Engineering 109, 116, 118, 126

Additional courses for medical or veterinary school application:

Chemistry 2C, 118C (medical)
Biological Sciences 101
Microbiology 102, 102L
Molecular and Cell Biology 150, 150L

Suggested Advisers: M. Delwiche, F. Fathallah, J. VanderGheynst

Biotechnical Engineering. This specialization is for students interested in the biotechnology industries. Core engineering courses are combined with training in genetics, biochemistry, microbiology, and molecular biology. Modern laboratory techniques in biochemistry are also included in the specialization to provide hands-on skills. Biotechnology is an area of industrial growth in the U.S. and will increasingly need engineers to transfer laboratory developments to large scale production. Present industrial activities include the production of genetically altered plants, plant materials and food products, production and packaging of biocontrol agents for plant pests and diseases; microbial production of biological products; tissue culture; and bioremediation.

Recommended biological science electives:

Biological Sciences 101, 102, 103
Microbiology 102
Molecular and Cellular Biology 120L
Plant Biology 113

Recommended engineering electives:

Biological Systems Engineering 175
Chemical Engineering 161B, 161C, 161L
Engineering 180

Suggested Advisers: M. Delwiche, J. Fan, K. Giles, M. Grismer, T. Jeoh, N. Nitin, J. VanderGheynst, R. Zhang

Ecological Systems Engineering. Specialists in ecological systems engineering are concerned with the design, development, and management of ecosystems. Typical applications include the rehabilitation of disturbed ecosystems, the design of mitigation areas, the incorporation of ecologically sustainable features into land developments, and the design and management of public and private landscapes. An understanding of ecology and the interaction of ecological communities, coupled with knowledge of engineering design and economics, are stressed in this specialization. Employment opportunities include environmental consulting firms, government regulatory agencies, and agencies involved in wild land resource management.

Recommended biological science electives:

Entomology 100
Environmental Science and Policy 100
Microbiology 120
Soil Science 100, 111
Select one course from Atmospheric Science 133, Plant Biology 121, Environmental Toxicology 101 or 112A

Recommended engineering electives:

Biological Systems Engineering 115, 135, 145
Civil and Environmental Engineering 148A or 149
Recommended courses:
Applied Biological Systems Technology 180
Environmental and Resource Science 100
Landscape Architecture 1 (no technical elective credit will be granted for this course in any engineering major)

Suggested Advisers: K. Giles, M. Grismer, B. Jenkins, R. Piedrahita, J. VanderGheynst, R. Zhan

Food Engineering. The food industry is the largest industrial sector of the U. S. economy. Food engineers conceive, design, and operate food processes, equipment, and plants for efficient food production with minimal impact on the environment. Students specializing in food engineering learn to apply engineering principles and concepts to handling, storing, processing, packaging, and distributing food and related products. In addition to engineering principles, the food engineering specialization is intended to provide an understanding of the chemical, biochemical, microbiological, and physical characteristics of foods. In the junior and senior years, students take courses that focus on the integration of biological and food science with engineering. Concepts of food refrigeration, freezing, thermal processing, drying, and other food operations are studied.

Recommended biological sciences electives:

Biological Sciences 101, 102, 103; Environmental Science and Policy 110; Environmental Toxicology 101, 131; Food Science and Technology 104L, 119, 120, 128; Plant Sciences 152, 172

Recommended engineering electives:

Biological Systems Engineering 160, 175; Chemical Engineering 157, 159; Mechanical Engineering 171, 172

Suggested Advisers: J. Krochta, K. McCarthy, M. McCarthy, N. Nitin, R. P. Singh, D. Slaughter

Forest Engineering. Forest engineers apply engineering principles to solve problems in managing forest lands. Forestry has evolved from an emphasis on wood production toward multiple use, ecosystem management and consideration of non-economic objectives such as retaining biodiversity. Forest engineers help to develop the equipment and techniques for reforestation, harvesting, forest residue management, and development of roads and recreation facilities.

Following the sophomore year, students are encouraged to attend an eight-week field course, followed by a semester at UC Berkeley taking forestry courses, and forest ecology, planning, and operations. Students complete their engineering programs at UC Davis, taking courses in planning methods, equipment development, and road design. Forest engineers are employed by the US Forest Service and other public agencies, the forest industry, consulting firms, and equipment manufacturers.

Recommended biological science electives:

Environmental Science Policy and Management 120* (Soil Characteristics, 4.5 units) or Soil Science 100
Environmental Science Policy and Management 182* (Forest Operations Management, 6 units)
Environmental Science Policy and Management 185* (Multi-Resource Silviculture, 6 units)

Recommended engineering electives:

Biological Systems Engineering 114, 115
Civil and Environmental Engineering 141, 141L, 171, 171L, 179

Recommended Courses:

Applied Biological Systems Technology 180
Environmental Science Policy and Management 101A-E* (Forestry Summer Program, 15 units)
Environmental and Resource Sciences 185
Plant Sciences 144

*Environmental Science Policy and Management courses are offered at UC Berkeley campus.

Suggested Adviser: B. Hartsough

Upper Division Required Courses

	UNITS
Chemistry 8A or 118A	2 or 4
Chemistry 8B or 118B	4
Engineering 100, 102, 104 105, 106	18
Biological Systems Engineering 103, 125, 127, 130, 165, 170A, 170B, 170BL, 170C, 170CL	29
Biological Systems Engineering electives-Select a minimum of 4 units from all upper-division Biological Systems Engineering courses not otherwise required, with the exception of Biological Systems Engineering courses 189-199	4
Statistics 100	4
Engineering electives—Select a minimum of 3 units. All upper division courses offered by the College of Engineering may be taken as engineering electives with the exception of the following: Civil and Environmental Engineering 123, Computer Science Engineering 188, Engineering 103, 160, all courses numbered 190-197 and 199 (except Engineering 190, which may be taken for 2 units of engineering elective credit).	3
Biological science electives—All upper-division courses in the College of Biological Sciences (with the exception of Biological Sciences 132, Evolution and Ecology 175, Exercise Biology 102, 112, 115, 118 through 149L, Microbiology 100 and all courses numbered 190-199) may be used as biological science electives. The following courses may also be taken as biological science electives: Applied Biological Systems Technology 161; Animal Science 118, 143, 144, 146; Agricultural Management and Rangeland Resources 110A; Atmospheric Science 133; Avian Sciences 100; Cell Biology and Human Anatomy 101, 101L; Entomology 100; Environmental Horticulture 102; Environmental Science Policy and Management 120, 182, 185 (offered at UC Berkeley); Environmental Science and Policy 100, 110, 155; Environmental Toxicology 101, 112A, 131; Food Science and Technology 102A, 104L, 119, 120, 121, 128, 159; Infectious Diseases 141; Soil Science 100; Wildlife, Fish, and Conservation Biology 121. Students may choose other upper division courses with substantial biological content offered by the College of Agricultural and Environmental Sciences; consultation with a faculty adviser and approval by petition is required)	4
Upper Division Composition Requirement* one course from the following: University	

Writing Program 101, 102A, 102B, 102E, 102F, 102G, 104A, 104E, 104F 4
General Education electives..... 16
Minimum Upper Division Units 88

** The Upper-Division composition exam administered by the College of Letters and Sciences cannot be used to satisfy the upper-division composition requirement for students in the Biological Systems Engineering program.*

Minimum Units Required for Major..... 184

Master Undergraduate Adviser: R. Piedrahita

Energy Minor Programs:

There is an urgent need to develop and commercialize technologies for the sustainable conversion and use of energy. The goal of these minors is to prepare students for careers that require training in energy science and technology and energy policy. Cleantech and green-tech markets including energy are some of the fastest growing in new investment, and well-trained individuals in all related fields are needed to provide the level of expertise required to advance technology and policy, and to satisfy state, national, and international objectives for greater energy sustainability. The minors are expected to accommodate persons of diverse background with educational interests in areas that may include engineering, science, policy, economics, planning, and management.

Energy Science and Technology Minor

All courses must be taken for a letter grade. Grade of *C-* or better required for all courses used to satisfy minor requirements with overall GPA in minor requirement courses of 2.000 or better.

Minor Requirements:

	UNITS
Engineering 105 or Chemical Engineering 152B	4
Applied Science 188	4
Select 12 units from: Biological Systems Engineering 162; Chemical Engineering 146, 158C, 161A, 161B, 161L, 166; Civil Engineering 125, 143, 162, 163; Mechanical Engineering 161; Agricultural and Resource Economics 175; Food Science and Technology 123; Applied Biological Systems Technology 182; Atmospheric Science 116; Plant Science 101; Environmental Science and Policy 167	12

Total Units for the Minor..... 20

Minor Advisors: Bryan Jenkins (Department of Biological and Agricultural Engineering), Karen McDonald (Department of Chemical Engineering and Materials Science), Case vanDam (Department of Mechanical and Aerospace Engineering)

Energy Policy Minor

All courses must be taken for a letter grade. Grade of *C-* or better required for all courses used to satisfy minor requirements with overall GPA in minor requirement courses of 2.000 or better.

Minor Requirements:

	UNITS
Applied Science 188 and Environmental Science and Policy	8
Select 10 units from: Civil Engineering 125; Environmental Science and Policy 171, 163, 168A, 169B; Political Science 105, 109, 122, 164 143, 162, 164;	10

Total Units for the Minor..... 18

Minor Advisors: Deb Niemeier (Department of Civil and Environmental Engineering), Joan Ogden (Environmental Science and Policy)

The Graduate Program in Biological Systems Engineering

Integrated B.S./M.S, M.S., M.Engr., D.Engr., and Ph.D. in Biological Systems Engineering
Designated Ph.D. emphasis available in Biotechnology
http://bae.engineering.ucdavis.edu
(530) 752-1451

Graduate students in Biological Systems Engineering focus on finding economically and environmentally sustainable solutions to many of the most important global issues of our time-the safety, security and abundance of our food, detection of pathogens, development of bio-energy alternatives, control of insect-borne disease and damage, as well as the preservation of our land, air and water resources.

We enjoy the strategic advantage of being located in California, the national leader in agricultural production and crop diversity, and a major center for biotechnology. With the unique status of belonging to both the College of Engineering and the College of Agricultural and Environmental Sciences, collaboration is the rule. We interact with colleagues in both engineering and the life sciences to create multidisciplinary approaches to our teaching and research. Students benefit from this dynamic environment that combines the strengths of nationally ranked engineering, agricultural and environmental programs.

Financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid.

Research Highlights:

- Bioenvironmental Engineering
- Renewable Energy
- Industrial Biotechnology
- Food Safety
- Biosensors
- Bioprocess Engineering
- Bioinstrumentation
- Ergonomics, Health and Safety
- Aquacultural Engineering
- Ecological Systems Engineering
- Food Engineering
- Forest and Fiber Engineering
- Postharvest Engineering
- Soil and Water Engineering
- Machine Systems and Precision Agriculture

Research Facilities and Partnerships:

- Agricultural Ergonomics Research Center
- GIS Visualization Lab
- Energy Institute
- Bodega Marine Lab
- Western Center for Agricultural Equipment
- California Biomass Collaborative

Complete Information on departmental website.

Courses in Engineering: Biological Systems (EBS)

Lower Division Courses

1. Foundations of Biological Systems Engineering (4)

Lecture—2 hours; laboratory—3 hours; project—3 hours. Restricted to students in Biological Systems Engineering. Introduction to engineering and the engineering design process with examples drawn from the field of biological systems engineering. Introduction to computer-aided design and mechanical fabrication of designs. Students work on a quarter-long group design project.—I. (I.) Jenkins, Piedrahita

75. Properties of Materials in Biological Systems (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A; Physics 9C (may be taken concurrently). Properties of typical biological materials; composition and structure with emphasis on the effects of physical and biochemical properties on design of engineered systems; interactions of biological materials with typical engineering materials. GE credit: SciEng.—II. (II.) Jeoh, Slaughter

90C. Research Group Conference in Biological Systems Engineering (1)

Discussion—1 hour. Prerequisite: lower division standing in Biological Systems Engineering or Food Engineering; consent of instructor. Research group conference. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

92. Internship in Biological Systems Engineering (1-5)

Internship. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5)

Prerequisite: consent of instructor. Group study of selected topics; restricted to lower division students. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5)

(P/NP grading only.)

Upper Division Courses

103. Fluid Mechanics Fundamentals (4)

Lecture—4 hours. Prerequisite: Physics 9B. Fluid mechanics axioms, fluid statics, kinematics, velocity fields for one-dimensional incompressible flow and boundary layers, turbulent flow time averaging, potential flow, dimensional analysis, and macroscopic balances to solve a range of practical problems. (Same course as Hydrologic Science 103N.)—II. (II.) Wallender

114. Principles of Field Machinery Design (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102, 104. Traction and stability of vehicles with wheels or tracks. Operating principles of field machines and basic mechanisms used in their design.—III. Rosa

115. Forest Engineering (3)

Lecture—3 hours. Prerequisite: Engineering 104, Biological Sciences 1C. Applications of engineering principles to problems in forestry including those in forest regeneration, harvesting, residue utilization, and transportation.—(III.) Hartsough

120. Power Systems Design (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 17, 102, 103, 105. Design and performance of power devices and systems including combustion engines, electric generators and motors, fluid power systems, fuels, and emerging technologies. Selection of units for power matching and optimum performance.—I. (I.) Rosa

125. Heat Transfer in Biological Systems (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 103; Engineering 105; Biological Sciences 2A, 2B and 2C. Fundamentals of heat transfer with application to biological systems. Steady and transient heat transfer. Analysis and simulation of heat conduction, convection and radiation. Heat transfer operations.—III. (III.) Fan, Nitin

127. Mass Transfer and Kinetics in Biological Systems (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 125. Fundamentals of mass transfer and kinetics in biological systems. Molecular diffusion and convection. Thermodynamics and bioenergetics. Biological and chemical rate equations. Heterogeneous kinetics. Batch and continuous reaction processes.—I. (I.) VanderGheynst, Zicari

128. Biomechanics and Ergonomics (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: Statistics 100, Engineering 102. Anatomical, physiological, and biomechanical bases of physical ergonomics. Human motor capabilities, body mechanics, kinematics and anthropometry. Use of bioinstrumentation, industrial surveillance techniques and the NIOSH lifting guide. Cumulative trauma disorders. Static and dynamic biomechanical modeling. Emphasis on low back, shoulder, and hand/wrist biomechanics.—III. (III.) Fathallah

130. Modeling of Dynamic Processes in Biological Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 75, Engineering 6 or Computer Science Engineering 30, Mathematics 22B. Techniques for modeling processes through mass and energy balance, rate equations, and equations of state. Computer problem solution of models. Example models include package design, evaporation, respiration heating, thermal processing of foods, and plant growth.—II. (II.) K. McCarthy, Upadhyaya

135. Bioenvironmental Engineering (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 125, 130. Biological responses to environmental conditions. Principles and engineering design of environmental control systems. Overview of environmental pollution problems and legal restrictions for biological systems, introduction of environmental quality assessment techniques, and environmental pollution control technologies.—I. (I.) Jenkins, Zhang

144. Groundwater Hydrology (4)
Lecture—4 hours. Prerequisite: Mathematics 16B or 21A; Hydrologic Science 103 or Engineering 103 recommended. Fundamentals of groundwater flow and contaminant hydrology. Occurrence, distribution, and movement of groundwater. Well-flow systems. Aquifer tests. Well construction operation and maintenance. Groundwater exploration and quality assessment. Agricultural threats to groundwater quality: fertilizers, pesticides, and salts. Same course as Hydrologic Science 144.—I. (I.) Fogg

145. Irrigation and Drainage Systems (4)
Lecture—4 hours. Prerequisite: Engineering 103 or Hydrologic Science 103. Engineering and scientific principles applied to the design of surface, sprinkle and micro irrigation systems and drainage systems within economic, biological, and environmental constraints. Interaction between irrigation and drainage. (Same course as Hydrologic Science 115.)—II. Grismer, Wallender

147. Runoff, Erosion and Water Quality Management in the Tahoe Basin (3)
Lecture/laboratory—30 hours; fieldwork—15 hours; discussion—10 hours; term paper. Prerequisite: Physics 7B or 9B, Mathematics 16C or 21C, Civil and Environmental Engineering 142 or Hydrologic Science 141 or Environmental and Resource Sciences 100. Five days of instruction in Tahoe City. Practical hydrology and runoff water quality management from Tahoe Basin slopes. Development of hillslope and riparian restoration concepts, modeling and applications from physical science perspectives including precipitation-runoff relationships, sediment transport, and detention ponds. (Same course as Hydrologic Science 147.)—Grismer

162. Industrial Bioprocessing (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 127. Introduction to biorefineries and major industrial bioprocesses including feedstock logistics and properties, biochemical and thermochemical conversion systems, processing for higher value products such as enzymes and fuels. Laboratories provide experience in feedstock and process design and characteristics.—II. (II.) Fan, Jenkins, VanderGheynst, Zhang, Zicari

165. Bioinstrumentation and Control (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Instrumentation and control for biological production systems. Measurement system concepts, instrumentation and transducers for sensing physical and biological parameters, data acquisition and control.—I. (I.) Delwiche, Slaughter

170A. Engineering Design and Professional Responsibilities (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 1, Engineering 102, 104. Engineering design including professional responsibilities. Emphasis on project selection, data sources, specifications, human factors, biological materials, safety systems, and professionalism. Detailed design proposals will be developed for courses 170B and 170BL.—I. (I.) Giles, Zhang

170B. Engineering Projects: Design (2)
Discussion—2 hours. Prerequisite: course 170A; course 170BL required concurrently. Individual or group projects involving the design of devices, structures, or systems to solve specific engineering problems in biological systems. Project for study is jointly selected by student and instructor.—II. (II.) Giles, Zhang

170BL. Engineering Projects: Design Laboratory (1)
Laboratory—3 hours. Prerequisite: course 170B required concurrently. Individual or group projects involving the design of devices, structures, or systems to solve specific engineering problems in biological systems.—II. (II.)

170C. Engineering Projects: Design Evaluation (1)
Discussion—1 hour. Prerequisite: course 170B; required to enroll in course 170CL concurrently. Individual or group projects involving the fabrication, assembly and testing of components, devices, structures, or systems designed to solve specific engineering problems in biological systems. Project for study previously selected by student and instructor in course 170B.—III. (III.) Giles, Zhang

170CL. Engineering Projects: Design Evaluation (2)
Laboratory—6 hours. Prerequisite: required to enroll in course 170C concurrently. Individual or group projects involving the fabrication, assembly and testing of components, devices, structures, or systems designed to solve specific engineering problems in biological systems.—III. (III.)

175. Rheology of Biological Materials (3)
Lecture—3 hours. Prerequisite: Engineering 103 or Chemical Engineering 150A. Fluid and solid rheology, viscoelastic behavior of foods and other biological materials, and application of rheological properties to food and biological systems (i.e., pipeline design, extrusion, mixing, coating).—II. K. McCarthy

189A-G. Special Topics in Biological Systems Engineering (1-5)
Variable—3-15 hours. Prerequisite: upper division standing in engineering; consent of instructor. Special topics in: (A) Agricultural Engineering; (B) Aquacultural Engineering; (C) Biomedical Engineering; (D) Biotechnical Engineering; (E) Ecological Systems Engineering; (F) Food Engineering; and (G) Forest Engineering. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

190C. Research Group Conference in Biological Systems Engineering (1)
Discussion—1 hour. Prerequisite: upper division standing in Biological Systems Engineering or Food Engineering; consent of instructor. Research group conference. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship in Biological Systems Engineering (1-5)
Internship. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in biological systems engineering. May be repeated for credit. (P/NP grading only.)

197T. Tutoring in Biological Systems Engineering (1-5)
Tutorial—3-15 hours. Prerequisite: upper division standing. Tutoring individual students, leading small voluntary discussion groups, or assisting the instructor in laboratories affiliated with one of the department's regular courses. May be repeated for credit if topic differs. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

200. Research Methods in Biological Systems Engineering (2)
Lecture—2 hours. Prerequisite: graduate standing. Planning, execution and reporting of research projects. Literature review techniques and proposal preparation. Record keeping and patents. Uncertainty analysis in experiments and computations. Graphic analysis. Oral and written presentation of research results, manuscript preparation, submission and review.—I. (I.) Zhang, Giles

205. Continuum Mechanics of Natural Systems (4)
Lecture/discussion—4 hours. Prerequisite: Mathematics 21D and 22B, Physics 9B. Continuum mechanics of static and dynamic air, water, earth and biological systems using hydraulic, heat and electrical conductivity; diffusivity; dispersion; strain; stress; deformation gradient; velocity gradient; stretch and spin tensors. (Same course as Hydrologic Science 205.)—III. Wallender

215. Soil-Machine Relations in Tillage and Traction (3)
Lecture—3 hours. Prerequisite: course 114. Mechanics of interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil; analyses of stress and strains in soil due to machine-applied loads; experimental and analytical methods for synthesizing characteristics of overall systems. Offered in alternate years.—(II.) Upadhyaya

216. Energy Systems (3)
Lecture—3 hours. Prerequisite: Engineering 105. Theory and application of energy systems. System analysis including input-output analysis, energy balances, thermodynamic availability, economics, environmental considerations. Energy conversion systems and devices including cogeneration, heat pump, fuel cell, hydroelectric, wind, photovoltaic, and biomass conversion processes. Offered in alternate years.—II. Jenkins

218. Solar Thermal Engineering (3)
Lecture—3 hours. Prerequisite: course in heat transfer. Familiarity with FORTRAN language. Analysis and design of solar energy collection systems. Sun-earth geometry and estimation of solar radiation. Steady state and dynamic models of solar collectors. Modeling of thermal energy storage devices. Computer simulation. Offered in alternate years.—III. Jenkins

220. Pilot Plant Operations in Aquacultural Engineering (3)
Lecture—1 hour; laboratory—6 hours. Prerequisite: Civil Engineering 243A-243B or Applied Biological Systems Technology 161, 163. Topics in water treatment as they apply to aquaculture operations. Laboratory study of unit operations in aquaculture. Offered in alternate years.—(I.) Piedrahita

228. Occupational Musculoskeletal Disorders (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: graduate standing and consent of instructor. Epidemiology and etiology of occupational musculoskeletal disorders (MSDs) with focus on low back and upper extremities disorders; anatomical and biomechanical functions of lower back and upper extremities; MSDs risk factors assessment and control; research opportunities related to MSDs.—III. (III.) Fathallah

231. Mass Transfer in Food and Biological Systems (3)
Lecture/discussion—3 hours. Prerequisite: graduate standing. Application of mass transfer principles to food and biological systems. Study of mass transfer affecting food quality and shelf life. Analysis of mass transfer in polymer films used for coating and packaging foods and controlling release of biologically active compounds. Offered in alternate years.—(II.) Krochta, K. McCarthy

233. Analysis of Processing Operations: Drying and Evaporation (3)
Lecture—3 hours. Prerequisite: course in food or process engineering, familiarity with FORTRAN. Diffusion theory in drying of solids. Analysis of fixed-bed and continuous-flow dryers. Steady-state and dynamic models to predict performance evaporators: multiple effects, mechanical and thermal recompression, control systems. Offered in alternate years.—(II.)

235. Advanced Analysis of Unit Operations in Food and Biological Engineering (3)
Lecture—3 hours. Prerequisite: course 132. Analysis and design of food processing operations. Steady state and dynamic heat and mass transfer models for operations involving phase change such as freezing and frying. Separation processes including membrane applications in food and fermentation systems.—(III.) Singh

237. Thermal Process Design (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course in heat transfer. Heat transfer and biological basis for design of heat sterilization of foods and other biological materials in containers or in bulk. Offered in alternate years.—III.

239. Magnetic Resonance Imaging in Biological Systems (3)
Lecture—3 hours. Prerequisite: graduate standing. Theory and applications of magnetic resonance imaging to biological systems. Classical Bloch model of magnetic resonance. Applications to be studied are drying of fruits, flow of food suspensions, diffusion of moisture, and structure of foods. Offered in alternate years.—I. M. McCarthy

240. Infiltration and Drainage (3)
Lecture—3 hours. Prerequisite: Soil Science 107, Engineering 103. Aspects of multi-phase flow in soils and their application to infiltration and immiscible displacement problems. Gas phase transport and entrapment during infiltration, and oil-water-gas displacement will be considered. Offered in alternate years.—II. Grismer

241. Sprinkle and Trickle Irrigation Systems (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 145/Hydrologic Science 115. Computerized design of sprinkle and trickle irrigation systems. Consideration of emitter mechanics, distribution functions and water yield functions. Offered in alternate years.—III.

242. Hydraulics of Surface Irrigation (3)
Lecture—3 hours. Prerequisite: course 145, Hydrologic Science 115. Mathematical models of surface-irrigation systems for prediction of the ultimate disposition of water flowing onto a field. Quantity of runoff and distribution of infiltrated water over field length as a function of slope, roughness, infiltration and inflow rates. Offered in alternate years.—(III.) Wallender

243. Water Resource Planning and Management (3)
Lecture—3 hours. Prerequisite: Hydrologic Science 141 or the equivalent. Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, design, and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (Same course as Hydrologic Science 243.) Offered in alternate years—(I.)

245. Waste Management for Biological Production Systems (3)
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Characterization of solid and liquid wastes from animal, crop, and food production systems. Study of methods and system design for handling, treatment, and disposal/utilization of these materials.—II. (II.) Zhang

260. Analog Instrumentation (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Instrument characteristics: generalized instrument models, calibration, and frequency response. Signal conditioning: operational amplifier circuits, filtering, and noise. Transducers: motion, force, pressure, flow, temperature, and photoelectric. Offered in alternate years.—II. Delwiche

262. Computer Interfacing and Control (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100, course 165. Procedural and object-oriented programming in C++, analog and digital signal conversion, data acquisition and computer control. Offered in alternate years.—(III.) Delwiche

265. Design and Analysis of Engineering Experiments (5)
Lecture—3 hours; lecture/discussion—2 hours. Prerequisite: Statistics 100, Agricultural Systems and Environment 120, or an introductory course in statistics. Simple linear, multiple, and polynomial regression, correlation, residuals, model selection, one-way ANOVA, fixed and random effect models, sample size, multiple comparisons, randomized block, repeated measures, and Latin square designs, factorial experiments, nested design and subsampling, split-plot design, statistical software packages.—III. (III.) Upadhyaya, Plant

267. Renewable Bioprocessing (3)
Lecture—3 hours. Prerequisite: course 160, Biological Sciences 101 or Microbiology 102. Applications of biotechnology and bioprocess engineering toward the use of agricultural and renewable feedstocks for the production of biochemicals. Design and modeling of microbial- and plant-based production systems including associated fermentation, extraction, and purification processes. Offered in alternate years.—I. VanderGheynst

270. Modeling and Analysis of Biological and Physical Systems (3)
Lecture—3 hours. Prerequisite: familiarity with a programming language. Mathematical modeling of biological systems: model development; analytical and numerical solutions. Case studies from various specializations within biological and agricultural engineering. Offered in alternate years.—III. Upadhyaya

275. Physical Properties of Biological Materials (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected topics on physical properties, such as mechanical, optical, rheological, and aerodynamic properties, as related to the design of harvesting, handling, sorting, and processing equipment. Techniques for measuring and recording physical properties of biological materials. Offered in alternate years.—III. Slaughter, Rosa

289A-K. Selected Topics in Biological Systems Engineering (1-5)
Variable—1-5 hours. Prerequisite: consent of instructor. Special topics in: (A) Animal Systems Engineering; (B) Aquacultural Engineering; (C) Biological Engineering; (D) Energy Systems; (E) Environmental Quality; (F) Food Engineering; (G) Forest Engineering; (H) Irrigation and Drainage; (I) Plant Production and Harvest; (J) Postharvest Engineering; (K) Sensors and Actuators. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

290. Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing. Weekly seminars on recent advances and selected topics in biological systems engineering. Course theme will change from quarter to quarter. May be repeated for credit. (S/U grading only.)

290C. Graduate Research Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress and techniques in biological systems engineering. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Professional Course

390. Supervised Teaching in Biological and Agricultural Engineering (1-3)
Laboratory—3 hours; tutorial—3-9 hours. Prerequisite: graduate standing; consent of instructor. Tutoring and teaching students in undergraduate courses offered in the Department of Biological and Agricultural Engineering. Weekly conferences with instructor; evaluation of teaching. Preparing for and conducting demonstrations, laboratories and discussions. Preparing and grading exams. May be repeated for a total of 6 units. (S/U grading only.)—I, II, III. (I, II, III.)

Engineering: Biomedical

(College of Engineering)

Kyriacos Athanasiou, Chairperson of the Department

Department Office. 2303 Genome and Biomedical Sciences Facility (530) 752-1033; *http://www.bme.ucdavis.edu*

Faculty

Kyriacos Athanasiou, Ph.D., Distinguished Professor
Craig Benham, Ph.D., Professor *(Biomedical Engineering; and Mathematics; and Genome Center: Bioinformatics)*
John Boone, Ph.D., Professor *(Biomedical Engineering; and Medicine: Radiology)*
Ye Chen-Izu, Ph.D., Assistant Professor *(Biomedical Engineering; Pharmacology; and Internal Medicine)*
Simon Cherry, Ph.D., Professor *(Biomedical Engineering; and Medicine: Physiology and Membrane Biology)*
Fitz-Roy Curry, Ph.D., Professor *(Biomedical Engineering; and Medicine: Physiology and Membrane Biology)*
Marc Facciotti, Ph.D., Assistant Professor *(Biomedical Engineering; and Genome Center)*
Katherine Ferrara, Ph.D., Professor
David Fyhrie, Ph.D., Professor *(Biomedical Engineering; and Medicine: Orthopaedic Surgery)*
Volkmar Heinrich, Ph.D., Associate Professor
Maury Hull, Ph.D., Professor *(Biomedical Engineering; and Mechanical and Aerospace Engineering)*
Tonya Kuhl, Ph.D., Professor *(Biomedical Engineering; and Chemical Engineering & Materials Science)*
J. Kent Leach, Ph.D., Assistant Professor
Angelique Louie, Ph.D., Associate Professor
Laura Marcu, Ph.D., Professor *(Biomedical Engineering; and Medicine: Neurological Surgery)*
Tingrui Pan, Ph.D., Assistant Professor
Anthony Passerini, Ph.D., Assistant Professor
Jinyi Qi, Ph.D., Associate Professor
Subhadip Raychaudhuri, Ph.D., Assistant Professor
Alexander Revzin, Ph.D., Associate Professor
Leonor Saiz, Ph.D., Assistant Professor
Michael Savageau, Ph.D., Distinguished Professor
Scott Simon, Ph.D., Professor
Julie Sutcliffe, Ph.D. Associate Professor *(Biomedical Engineering; and Medicine: Hematology and Oncology)*
Soichiro Yamada, Ph.D., Assistant Professor
Yohei Yokobayashi, Ph.D., Associate Professor

The Biomedical Engineering Undergraduate Major

Modern Biomedical Engineering is a diverse and interdisciplinary area of study that integrates knowledge drawn from engineering and the biomedical sciences. Biomedical Engineers work in systems ranging from medical imaging to the design of artificial organs. Some major recent research advances in Biomedical Engineering include the left ventricular

assist device (LVAD), artificial joints, kidney dialysis, bioengineered skin, angioplasty, computed tomography (CT), and flexible endoscopes.

Students who choose Biomedical Engineering are interested in being of service to human health but do not routinely interact directly with patients. The mission of the BS degree program of the Department of Biomedical Engineering is to provide a cutting-edge, interdisciplinary, biomedical engineering education to students. To accomplish this, the Biomedical Engineering curriculum has been designed to provide a solid foundation in both engineering and the life sciences, and provide sufficient flexibility in the upper division requirements to encourage students to explore specializations within Biomedical Engineering.

The program produces highly qualified, interdisciplinary engineers who are well-prepared to pursue graduate or professional degrees and/or careers in industry, hospitals, academic research institutes, teaching, national laboratories, or government regulatory agencies. The Bureau of Labor Statistics projects that employment growth for Biomedical Engineering will be much faster than the average for all occupations through 2014. As a recently established program, the Biomedical Engineering program is not currently accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology. The program will pursue accreditation with ABET in the next accreditation cycle.

Objectives

Our teaching is designed to impart a strong foundation in mathematics, life and physical sciences, and engineering, as well as knowledge of contemporary issues at the forefront of biomedical engineering research. Students completing the program will: demonstrate their ability to conduct measurements on and interpret results from experiments involving living systems; design experiments, systems, devices, components, and processes to meet real-world challenges for solutions to problems in biomedical research and development; identify, formulate and solve engineering problems applied to questions in medicine and biology; work effectively in groups and communicate in oral, written, computer-based and graphical forms; have an understanding of the impact of engineering solutions in a global and societal context and a commitment to professionalism and ethical responsibility; be instilled with sense of need for life-long learning; use the techniques, skill, and modern engineering tools necessary for engineering practice and for successful pursuit of postbaccalaureate studies.

For information about the graduate degree options, see the Biomedical Engineering (A Graduate Group), on page 178.

Lower Division Required Courses

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

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C	15
Chemistry 2A-2B-2C, 8A-8B or 118A-118B	21
Engineering 6, 17	8
University Writing Program 1, or English 3, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
Communication 1	4
Biological Sciences 2A	4
Biomedical Engineering 1, 20	6
General Education electives	8
Minimum Lower Division Units	**92**

Upper Division Required Courses

Engineering 100 or Electrical and Computer Engineering 100	3
Engineering 105, 190	7
Biomedical Engineering 116 or Neurobiology Physiology Behavior 101	5
Biomedical Engineering 105, 106, 107, 108, 109, 110A-110B, 111	30
Science electives To be chosen according to specialization. Any graded upper division course in the Biological Sciences, Chemistry or Physics including Biological Sciences 2B, 2C, Biomedical Engineering 161A, 161S, 161L and Physics 9D, excluding courses for social science GE topical breadth.	8
Engineering electives Any graded upper division Biomedical Engineering course (except Biomedical Engineering 161A, 161S, 161L). No more than 4 units allowed from lower division coursework. Engineering 4, 35, 45, 102, 103, 104, 104L, 106; Electrical and Computer Engineering 110AB, 114, 118, 130AB, 140AB, 150AB, 151, 157AB; Applied Science Engineering 108AB, 108L, 161AB, 165, 166, 167, 169, 170, 172; Biological Systems Engineering 128, 130, 165, 175; Chemical Engineering 141, 144, 155AB, 160, 161AB, 161L, 170; Materials Science and Engineering 147, 160, 162, 162L, 164, 172, 172L, 174, 174L, 180, 181, 182; Mechanical Engineering 50, 150AB, 151, 152, 154, 165, 171, 172.	20
General Education electives	16
Minimum Upper Division Units	**89**
Minimum Units Required for Major	**181**

Additional upper division elective policies:

- 2 units from Chemistry 118AB may be applied toward Science elective if 118AB are also used to satisfy lower division subject credit.
- 2 units from Electrical and Computer Engineering 100 may be applied toward Engineering electives if Electrical and Computer Engineering 100 is taken to satisfy upper division subject credit.
- 4 units of Biomedical Engineering 199 may be counted toward Engineering or Science electives with approval of Biomedical Engineering undergraduate committee.

Science electives and Engineering Electives are to be selected in consultation with a staff or faculty advisor.

Areas of Specialization

Since Biomedical Engineering is defined so broadly, a degree in Biomedical Engineering can mean many different things. Specializing in a subfield of engineering can help to provide more in-depth expertise in a focus area. You have the option to specialize in a subfield of Biomedical Engineering through judicious selection of your upper division electives in consultation with a staff or faculty advisor. One of the strengths of the UC Davis program is this flexibility to design your own emphasis. Biomedical Engineering includes a number of diverse areas of study:

Bioinstrumentation

Development of devices used in diagnosis and treatment of disease or in biomedical research. This area applies electronics principles and techniques and can involve computer hardware design.

Biomaterials and Tissue Engineering

The study of living materials or the development of implantable synthetic materials. In this field Biomedical Engineers design materials that are biocompatible or bioactive for use in the human body. This area draws heavily from knowledge in the chemical and biological sciences.

Biomechanics

A broad subfield that includes orthopedic/rehabilitation engineering (design of wheelchairs, prosthetics etc) and the study of mechanical forces produced by biological systems. For example, biomechanics allows a better understanding of the fluid dynamics of blood flow and forces acting on tissue in the artery, to allow design of better cardiovascular interventions. This field involves more intensive study of mechanics, dynamics and thermodynamics.

Medical Imaging

The visualization of living tissues for diagnosis of disease. An imaging scientist can work in areas ranging from developing instruments for imaging, to creating algorithms for three-dimensional reconstruction of imaging data, to generating new contrast agents for enhancing image quality. Depending upon the area of medical imaging of interest, this field can require more in depth study in electronics, signal processing, chemistry or computer programming.

Systems Engineering

Study of basic biological and physiological processes using engineering principles. Techniques and principles from engineering are applied to understand biological systems at a fundamental level. For example, stresses and strains are studied in cells to better understand how they propel themselves through tissues; modeling of biochemical processes allows engineers to mathematically describe chemical reactions occurring in cells in order to predict abnormalities that may lead to development of disease.

Premedical Students

If you intend to apply to medical school you will need to fulfill additional coursework to meet admissions requirements for the various medical school programs. These courses will be in addition to the listed curricular requirements.

Courses in Biomedical Engineering (BIM)

Lower Division Courses

1. Introduction to Biomedical Engineering (2)

Lecture—2 hours. Introduction to the field of biomedical engineering with examples taken from the various areas of specialization within the discipline. Areas include: (1) biomedical imagining, (2) cellular engineering, (3) tissue engineering, (4) nano-technology, and (5) computational systems biology. (P/NP grading only.)—I. (I.) Savageau

20. Fundamentals of Bioengineering (4)

Lecture—4 hours. Prerequisite: Physics 9B; Mathematics 21D. Basic principles of mass, energy and momentum conservation equations applied to solve problems in the biological and medical sciences. Only two units of credit to students who have previously taken Chemical Engineering 51, Engineering 105, and course 106.—III. (III.) Yamada

99. Special Study for Undergraduates (1-5)

(P/NP grading only.)

Upper Division Courses

102. Quantitative Cell Biology (4)

Lecture/discussion—4 hours. Prerequisite: Biological Sciences 2A, Physics 9B, Mathematics 22B, Chemistry 8B. Use of engineering principles to understand fundamental cell biology. Emphasis on physical concepts underlying cellular processes including protein trafficking, cell motility, cell division and cell adhesion. Current topics including cell biology of cancer and stem cells will be discussed. Only two units of credit for students who have previously taken Biological Sciences 104 or Molecular and Cellular Biology 143. Offered in alternate years.—(I.) Yamada

105. Probability, Random Processes, and Statistics for Biomedical Engineers (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21D; upper division. Concepts of probability, random variables and processes, and statistical analysis with applications to engineering problems in biomedical sciences. Contents include discrete and continuous random variables, probability distributions and models, hypothesis testing, sta-

tistical inference and stochastic processes. Emphasis on BME applications. Limited to upper division standing.—I. (I.) Saiz

106. Biotransport Phenomena (4)
Lecture—4 hours. Prerequisite: course 20, Neurobiology, Physiology, and Behavior 101 or equivalent, Physics 9B, Mathematics 22B. Open to Biomedical Engineering majors only. Principles of momentum and mass transfer with applications to biomedical systems; emphasis on basic fluid transport related to blood flow, mass transfer across cell membranes, and the design and analysis of artificial human organs.—II. (II.) Leach

107. Mathematical Methods for Biological Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 20; Mathematics 22B; restricted to Biomedical Engineering majors only. Essential mathematical and numerical techniques for engineering problems in medicine and biology. Contents include matrix algebra, linear transforms, ordinary and partial differential equations, probability and stochastic processes, and an introduction to Monte Carlo and molecular dynamics simulations.—II. (II.) Raychaudhuri

108. Biomedical Signals and Control (4)
Lecture—4 hours. Prerequisite: Mathematics 22B; Engineering 6, 100 (can be taken concurrently); restricted to upper division Engineering students. Systems and control theory applied to biomedical engineering problems. Time-domain and frequency-domain analyses of signals and systems, convolution, Laplace and Fourier transforms, transfer function, dynamic behavior of first and second order processes, and design of control systems for biomedical applications. No credit for students who have taken Electrical and Computer Engineering 150A; two units of credit for students who have taken Mechanical Engineering 171.—III. (III.) Qi

109. Biomaterials (4)
Lecture—4 hours. Prerequisite: course 106; restricted to upper division Engineering majors. Introduce concepts most important for design, selection and application of biomaterials. Given the interdisciplinary nature of the subject, principles of polymer science, surface science, materials science and biology will be integrated into the course.—III. (III.) Revzin

110A-110B. Capstone Biomedical Engineering Design (2-2)
Laboratory—3 hours; lecture/discussion—1 hour. Prerequisite: courses 107, 108, 109. Application of bioengineering theory and experimental analysis culminating in the design of a unique solution to a problem. The design may be geared towards current applications in applied biomechanics, biotechnology or medical technology. (Deferred grading only, pending completion of sequence.)—II, III. (II, III.) Louie, Passerini

111. Biomedical Instrumentation Laboratory (6)
Lecture—4 hours; laboratory—6 hours. Prerequisite: courses 107 and 108; Statistics 120, 131A, or equivalent; Engineering 100; Neurology, Physiology, & Behavior 101. Basic biomedical signals and sensors. Topics include analog and digital records using electronic, hydrodynamic, and optical sensors, and measurements made at cellular, tissue and whole organism level. Limited to upper division Biomedical Engineering majors—II. (II.) Marcu, Pan

116. Physiology: Problem Solving and Biomedical Devices (5)
Lecture—2 hours; lecture/discussion—3 hours. Prerequisite: Biological Sciences 2A, Mathematics 22B, Physics 9C. Basic human physiology for the nervous, cardiovascular, respiratory, gastrointestinal, renal, and endocrine systems. Emphasis on small group design projects and presentations in interdisciplinary topics relating biomedical engineering to medical diagnostic and therapeutic applications. GE Credit: Wrt.—I. (I.) Louie

117. Analysis of Molecular and Cellular Networks (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A and Mathematics 22B. Network themes in biology, emphasizing metabolic, genetic, and developmental networks. Mathematical and computational methods for analysis of such networks. Elucidation of design principles in natural networks. Engineering and ethical issues in the design of synthetic networks.—III. (III.) Savageau

126. Tissue Mechanics (3)
Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: Exercise Science 103 and/or Engineering 45 and/or consent of instructor. Structural and mechanical properties of biological tissues, including bone, cartilage, ligaments, tendons, nerves, and skeletal muscle. (Same course as Exercise Science 126.)—II. (II.) Hawkins

140. Protein Engineering (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 2A, Chemistry 8B. Introduction to protein structure and function. Modern methods for designing, producing, and characterizing novel proteins and peptides. Design strategies, computer modeling, heterologous expression, in vitro mutagenesis. Protein crystallography, spectroscopic and calorimetric methods for characterization, and other techniques.—I. (I.) Facciotti

141. Cell and Tissue Mechanics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 9C, Engineering 35, Neurobiology, Physiology, and Behavior 101. Mechanical properties that govern blood flow in the microcirculation. Concepts in blood rheology and cell and tissue viscoelasticity, biophysical aspects of cell migration, adhesion, and motility.—III. (III.) Simon

142. Biomedical Imaging: Basic Principles and Practice (4)
Lecture—3 hours; term paper. Prerequisite: course 107, 108 (may be taken concurrently), Physics 9D and Mathematics 22B. Basic physics, engineering principles, and applications of biomedical imaging techniques including x-ray imaging, computed tomography, magnetic resonance imaging, ultrasound and nuclear imaging.—III. (III.) Ferrara

151. Mechanics of DNA (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A and Mathematics 22B. Structural, mechanical and dynamic properties of DNA. Topics include DNA structures and their mechanical properties, in vivo topological constraints on DNA, mechanical and thermodynamic equilibria, DNA dynamics, and their roles in normal and pathological biological processes. Offered in alternate years.—III. Benham

161A. Biomolecular Engineering (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A; Chemistry 8B; upper division standing. Introduction to the basic concepts and techniques of biomolecular engineering such as recombinant DNA technology, protein engineering, and molecular diagnostics. Only three units of credit for students who have completed course 161S.—I. (I.) Yokobayashi

161L. Biomolecular Engineering Laboratory (2)
Laboratory/discussion—6 hours. Prerequisite: course 161A; upper division Biomedical Engineering major. Introduction to the basic techniques in biomolecular engineering. Laboratory and discussion sessions will cover basic techniques in DNA cloning, bacterial cell culture, protein expression, and data analysis. GE Credit: SciEng.—II. (II.) Yokobayashi

161S. Biomolecular Engineering: Brief Course (1)
Lecture—1 hour. Prerequisite: Biological Sciences 1A; Chemistry 8B; course 161L concurrently. Basic concepts and techniques in biomolecular analysis, recombinant DNA technology, and protein purification and analysis. Not open for credit to students who have completed Biomedical Engineering 161A. Not offered every year.—IV. Yokobayashi

162. Quantitative Concepts in Biomolecular Engineering (4)
Lecture—4 hours. Prerequisite: Mathematics 22B and Physics 9D. Introduction to fundamental physical mechanisms governing structure and function of biomacromolecules. Emphasis on a quantitative understanding of the nano- to microscale biomechanics of interactions between and within individual molecules, as well as of their assemblies, in particular membranes. Offered in alternate years.—II. Heinrich

167. Biomedical Fluid Mechanics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 106 (may be taken concurrently) or Engineering 103. Basic biofluid mechanics, Navier Stokes equations of motion, circulation, respiration and specialized applications including miscellaneous topics such as boundary layer flow. Not open for credit to students who have completed Mechanical Engineering 167C.

173. Cell and Tissue Engineering (4)
Lecture/discussion—4 hours. Prerequisite: course 109. Engineering principles to direct cell and tissue behavior and formation. Cell sourcing, controlled delivery of macromolecules, transport within and around biomaterials, bioreactor design, tissue design criteria and outcomes assessment.—I. (I.) Leach

189A-C. Topics in Biomedical Engineering (1-5)
Prerequisite: consent of instructor. Topics in Biomedical Engineering. (A) Cellular and Molecular Engineering (B) Biomedical Imaging (C) Biomedical Engineering. May be repeated if topic differs. Not offered every year.

190A. Upper Division Seminar in Biomedical Engineering (1)
Seminar—1 hour. Prerequisite: upper division standing. In depth examination of research topics in a small group setting. Question and answer session with faculty members. May be repeated for credit. (P/NP grading only.)

192. Internship in Biomedical Engineering (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Restricted to upper division majors. Supervised work experience in the Biomedical Engineering field. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. May be repeated up to three times for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

The Graduate Program in Biomedical Engineering

Doctoral and Masters degrees in Biomedical Engineering are offered through the interdisciplinary Graduate Group in Biomedical Engineering. Please see *http://www.bme.ucdavis.edu* and Biomedical Engineering (A Graduate Group), on page 178 of the catalog for a description of graduate education offerings, requirements, group faculty and research foci.

Graduate Courses

202. Cell and Molecular Biology for Engineers (4)
Lecture/discussion—4 hours. Prerequisite: Biological Sciences 104 or Molecular and Cellular Biology 121. Preparation for research and critical review in the field of cell and molecular biology for biomedical or applied science engineers. Emphasis on biophysical and engineering concepts intrinsic to specific topics including receptor-ligand dynamics in cell signaling and function, cell motility, DNA replication and RNA processing, cellular energetics and protein sorting. Modern topics in bioinformatics and proteomics.—II. (II.) Yamada

204. Physiology for Bioengineers (5)
Lecture—4 hours. Prerequisite: Biological Sciences 1A or equivalent; graduate standing or consent of instructor. Basic human physiology of the nervous, muscular, cardiovascular, respiratory, and renal systems and their interactions; Emphasis on the physical and engineering principles governing these systems, including control and transport processes, fluid dynamics, and electrochemistry.—I. (I.) Benham

209. Scientific Integrity for Biomedical Engineers (2)
Lecture—1 hour; discussion—1 hour. Scientific integrity and ethics for biomedical engineers, with emphasis and discussion on mentoring, authorship and peer review, use of humans and animals in biomedical research, conflict of interest, intellectual property, genetic technology and scientific record keeping. Biomedical Engineering majors only. (S/U grading only.)—III. (III.) Simon

210. Introduction to Biomaterials (4)
Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor. Mechanical and atomic properties of metallic, ceramic, and polymeric implant materials of metallic, ceramic, and polymeric implant materials; corrosion, degradation, and failure of implants; inflammation, wound and fracture healing, blood coagulation; properties of bones, joints, and blood vessels; biocompatibility of orthopaedic and cardiovascular materials.

211. Design of Polymeric Biomaterials and Biological Interfaces (4)
Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor; upper division undergraduates or graduate students. Design, selection and application of polymeric biomaterials. Integration of the principles of polymer science, surface science, materials science and biology.—II. (II.) Revzin

212. Biomedical Heat and Mass Transport Processes (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 165, Biological Systems Engineering 125, Chemical Engineering 153 or the equivalent. Application of principles of heat and mass transfer to biomedical systems related to heat exchange between the biomedical system and its environment, mass transfer across cell membranes and the design and analysis of artificial human organs. (Same course as Mechanical and Aeronautical Engineering 212.) Offered in alternate years.—(II.) Alderidge

213. Principles and Applications of Biological Sensors (4)
Lecture—4 hours. Prerequisite: Chemistry 2C. Biological sensors based on principles of electrochemical, optical and affinity detection. Methods for integration of sensing elements (e.g. enzymes) into biosensors and miniaturization of biosensors.—I. (I.) Revzin

214. Blood Cell Biomechanics (4)
Lecture—4 hours. Prerequisite: Engineering 102. Mechanical properties that govern blood flow in the microcirculation and cell adhesion and motility. Constitutive equations of vasculature tissue and blood. Blood rheology and viscoelasticity. Red and white blood cell mechanics. Remodeling of blood vessels in disease and engineering of blood vessels and cells.—II. Simon

215. Biomedical Fluid Mechanics and Transport Phenomena (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 or Chemical Engineering 150B or Civil and Environmental Engineering 141. Application of fluid mechanics and transport to biomedical systems. Flow in normal physiological function and pathological conditions. Topics include circulatory and respiratory flows, effect of flow on cellular processes, transport in the arterial wall and in tumors, and tissue engineering. (Same course as Mechanical and Aeronautical Engineering 215.)—III. (III.) Barakat

216. Advanced Topics in Cellular Engineering (4)
Lecture—4 hours. Prerequisite: course 214 or consent of instructor. Advanced research strategies and technologies used in the study of immune function and inflammation. Static and dynamic measurements of stress, strain, and molecular scale forces in blood and vascular cells, as well as genetic approaches to the study of disease.—I. (I.) Simon

217. Mechanobiology in Health and Disease (4)
Lecture/discussion—4 hours. Prerequisite: course 106 or equivalent (e.g. Engineering 103), Biological Sciences 101 or equivalent, Neurology, Physiology, and Behavior 101 or equivalent. Principles by which biomechanical forces affect cell and tissue function to impact human health and disease. Emphasis on cardiovascular system: structure and function, biofluid mechanics and mechanotransduction, disease mechanisms and research methods. Cartilage, bone and other systems; current topics discussed.—III. (III.) Passerini

218. Microsciences (4)
Lecture/discussion—4 hours. Introduction to the theory of physical and chemical principles at the microscale. Scale effects, surface tension, microfluidic mechanics, micromechanical properties, intermolecular interactions and micro tribology.—I. (I.) Pan

222. Cytoskeletal Mechanics (4)
Lecture/discussion—4 hours. Prerequisite: course 202. Current topics in cytoskeletal mechanics including physical properties of the cytoskeleton and motor proteins, molecular force sensor and generator, cytoskeletal regulation of cell motility and adhesion. Offered in alternate years.—(I.) Yamada

223. Multibody Dynamics (4)
Lecture—4 hours. Prerequisite: Engineering 102. Coupled rigid-body kinematics/dynamics; reference frames; vector differentiation; configuration and motion constraints; holonomicity; generalized speeds; partial velocities; mass; inertia tensor/theorems; angular momentum; generalized forces; comparing Newton/Euler, Lagrange's, Kane's methods; computer-aided equation derivation; orientation; Euler; Rodrigues parameters. (Same course as Mechanical and Aeronautical Engineering 223.)—II. (II.) Eke, Hubbard

225. Spatial Kinematics and Robotics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: C Language and course 222. Spatial kinematics, screw theory, spatial mechanisms analysis and synthesis, robot kinematics and dynamics, robot workspace, path planning, robot programming, real-time architecture and software implementation. (Same course as Mechanical and Aeronautical Engineering 225.) Offered in alternate years.—II. Cheng

227. Research Techniques in Biomechanics (4)
Lecture—2 hours; laboratory—4 hours; term paper/discussion—1 hour. Prerequisite: consent of instructor, Mathematics 22B; Exercise Science 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques evaluated include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional videography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as Mechanical and Aeronautical Engineering 227/Exercise Science 227.)—II. (II.) Williams, Hawkins

228. Skeletal Muscle Mechanics: Form, Function, Adaptability (4)
Lecture—4 hours. Prerequisite: basic background in biology, physiology, and engineering; Engineering 35 and 45, Mathematics 21D; Neurobiology, Physiology, and Behavior 101 recommended. Basic structure and function of skeletal muscle examined at the microscopic and macroscopic level. Muscle adaptation in response to aging, disease, injury, exercise, and disuse. Analytic models of muscle function are discussed. (Same course as Exercise Science 228.)—I. (I.) Hawkins

231. Musculo-Skeletal System Biomechanics (4)
Lecture—4 hours. Prerequisite: Engineering 102. Mechanics of skeletal muscle and mechanical models of muscle, solution of the inverse dynamics problem, theoretical and experimental methods of kinematic and kinetic analysis, computation of intersegmental load and muscle forces, applications to gait analysis and sports biomechanics. (Same course as Mechanical and Aeronautical Engineering 231.)—III. (III.) Hull

232. Skeletal Tissue Mechanics (3)
Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104B. Overview of the mechanical properties of the various tissues in the musculoskeletal system, the relationship of these properties to anatomic and histologic structure, and the changes in these properties caused by aging and disuse. The tissues covered include bone, cartilage and synovial fluid, ligament and tendon. (Same course as Mechanical and Aeronautical Engineering 232.)—III. (III.) Fyhrie

239. Advanced Finite Elements and Optimization (4)
Lecture—4 hours. Prerequisite: Engineering 180 or Applied Science 115 or Mathematics 128C. Introduction to advanced finite elements and design optimization methods, with application to modeling of complex mechanical, aerospace and biomedical systems. Application of states of the art in finite elements in optimum design of components under realistic loading conditions and constraints. Offered in alternate years. (Same course as Mechanical Engineering 239.)—(II.) Sarigul-Klijn

240. Computational Methods in Nonlinear Mechanics (4)
Lecture—4 hours. Prerequisite: Applied Science Engineering 115 or Mathematics 128B or Engineering 180. Deformation of solids and the motion of fluids treated with state-of-the-art computational methods. Numerical treatment of nonlinear dynamics; classification of coupled problems; applications of finite element methods to mechanical, aeronautical, and biological systems. Offered in alternate years. (Same course as Mechanical and Aeronautical Engineering 240.)—II. Sarigul-Klign

241. Introduction to Magnetic Resonance Imaging (3)
Lecture—3 hours. Prerequisite: Physics 9D, Mathematics 22B. Equipment, methods, medical applications of MRI. Lectures review basic, advanced pulse sequences, image reconstruction, display and technology and how these are applied clinically. Lecture complements a more technical course. (course 246 can be taken concurrently.)—I. (I.) Buonocore

242. Introduction to Biomedical Imaging (4)
Lecture—4 hours. Prerequisite: Physics 9D and Electrical and Computer Engineering 106 or consent of instructor. Basic physics and engineering principles of image science. Emphasis on ionizing and nonionizing radiation production and interactions with the body and detectors. Major imaging systems: radiography, computed tomography, magnetic resonance, ultrasound, and optical microscopy.

243. Radiation Detectors for Biomedical Applications (4)
Lecture/discussion—4 hours. Prerequisite: Physics 9D, Mathematics 21D, 22B. Radiation detectors and sensors used for biomedical applications. Emphasis on radiation interactions, detection, measurement and use of radiation sensors for imaging. Operating principles of gas, semiconductor, and scintillation detectors.—II. (II.) Cherry

246. Magnetic Resonance Technology (3)
Lecture—3 hours. Prerequisite: Physics 9D, Mathematics 22B. Course covers MRI technology at an advanced level with emphasis on mathematical descriptions and problem solving. Topics include spin dynamics, signal generation, image reconstruction, pulse sequences, biophysical basis of T1, T2, RF, gradient coil design, signal to noise, image artifacts.—I. (I.) Buonocore

247. Current Concepts in Magnetic Resonance Imaging I (3)
Lecture—3 hours. Prerequisite: course 241 or 246 or consent of instructor. Modern pulse sequences, pulse sequence options, and biomedical/industrial applications; velocity encoded phase imaging and angiography, echo planar imaging, spiral imaging, computer simulation of MRI, fast spin echo, other topics.—Buonocore

248. Current Concepts in Magnetic Resonance Imaging II (3)
Lecture—3 hours. Prerequisite: course 247 or consent of instructor. Continuation of lecture coverage of modern pulse sequences, pulse sequence options, and biomedical/industrial applications: Control of tissue contrast by magnetization refocusing and spoiling, RF pulse design, diffusion and perfusion imaging, image artifact reduction methods, others.—Buonocore

250. Mathematical Methods of Biomedical Imaging (4)
Lecture—4 hours. Prerequisite: graduate standing or consent of instructor. Advanced mathematical techniques with emphasis on imaging systems. Matrices and vector spaces, Fourier analysis, integral transforms, signal representations, probability and random processes.

251. Medical Image Analysis (4)
Lecture—4 hours. Prerequisite: Electrical and Computer Engineering 106. Techniques for assessing the performance of medical imaging systems. Principles of digital image formation and processing. Measurements that summarize diagnostic image quality and the performance of human observers viewing those images. Definition of ideal observer and other mathematical observers that may be used to predict performance from system design features.

252. Computational Methods in Biomedical Imaging (4)
Lecture—4 hours. Prerequisite: course 108, Mathematics 22B, Electrical and Computer Engineering 106. Analytic tomographic reconstruction from projections in 2D and 3D; model-based image reconstruction methods; maximum likelihood and Bayesian methods; applications to CT, PET, and SPECT.—II. (II.) Qi

270. Biochemical Systems Theory (4)
Lecture—4 hours. Prerequisite: course 202 concurrently or consent of instructor. Systems biology at the biochemical level. Mathematical and computational methods emphasizing nonlinear representation, dynamics, robustness, and optimization. Case studies of signal-transduction cascades, metabolic networks and regulatory mechanisms. Focus on formulating and answering fundamental questions concerning network function, design, and evolution.—I. (I.) Savageau

271. Gene Circuit Theory (4)
Lecture—4 hours. Prerequisite: course 270 or 202 and consent of instructor. Analysis, design, and construction of gene circuits. Modeling strategies, elements of design, and methods for studying variations in design. Case studies involving prokaryotic gene circuits to illustrate natural selection, discovery of design principles, and construction of circuits for engineering objectives.—II. (II.) Savageau

272. Tissue Engineering (3)
Lecture/discussion—3 hours. Prerequisite: Biological Sciences 104 or Molecular and Cellular Biology 121. Based on morphogenetic signals, responding stem cells and extracellular matrix scaffolding. Design and development of tissues for functional restoration of various organs damaged/lost due to cancer, disease and trauma. Fundamentals of morphogenetic signals, responding stem cells and extracellular matrix scaffolding.—II. (II.) Reddi

273. Integrative Tissue Engineering and Technologies (4)
Lecture/discussion—4 hours. Prerequisite: courses 202 and 204 or similar; graduate standing; course 272 strongly encouraged, although not a prerequisite. Engineering principles to direct cell and tissue behavior and formation. Contents include controlled delivery of macromolecules, transport within and around biomaterials, examination of mechanical forces of engineered constructs, and current experimental techniques used in the field.—I. (I.) Leach

281. Acquisition and Analysis of Biomedical Signals (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100, Statistics 130A. Basic concepts of digital signal recording and analysis; sampling; empirical modeling; Fourier analysis, random processes, spectral analysis, and correlation applied to biomedical signals.—III. (III.) Heinrich

282. Biomedical Signal Processing (4)
Lecture—4 hours. Prerequisite: Electrical and Computer Engineering 150A, 150B. Characterization and analysis of continuous- and discrete-time signals from linear systems. Examples drawn from physiology illustrate the use of Laplace, Z, and Fourier transforms to model biological and bioengineered systems and instruments. Filter design and stochastic signal modeling. Genomic signal processing.

284. Mathematical Methods for Biomedical Engineers (4)
Lecture/discussion—4 hours. Prerequisite: Mathematics 22B, Statistics 130A, or consent of instructor; upper division biomedical engineering majors, and graduate students in sciences and engineering; priority given to Biomedical Engineering graduate students. Theoretical applications of linear systems, ordinary and partial differential equations, and probability theory and random processes that describe biological systems and instruments that measure them. Students will be introduced to numerical solution techniques in MATLAB.—(I.) I. Raychaudhuri

285. Computational Modeling in Biology and Immunology (4)
Lecture/discussion—4 hours. Prerequisite: graduate standing or consent of instructor. Essential computational modeling techniques in biology and immunology. Emphasis on applications of Monte Carlo methods in studying immune recognition and response. Introduction to Brownian dynamics and Molecular dynamics simulations as applied in molecular level diffusion and interactions.—III. (III.) Raychaudhuri

286. Nuclear Imaging in Medicine and Biology (4)
Lecture/discussion—4 hours. Prerequisite: course 243 or consent of instructor. Radioactive decay, interaction of radiation with matter, radionuclide production, radiation detection, digital autoradiography, gamma camera imaging, single photon emission computed tomography, positron emission tomography and applications of these techniques in biology and medicine.—III. (III.) Cherry

287. Concepts in Molecular Imaging (4)
Lecture—2 hours; lecture/discussion—2 hours; term paper. Prerequisite: Chemistry 2C, Mathematics 21C, Physics 9D, consent of instructor. Current techniques and tools for molecular imaging. Emphasis on learning to apply principles from the physical sciences to imaging problems in medicine and biology.—III. (III.) Sutcliffe

289A-E. Selected Topics in Biomedical Engineering (1-5)
Variable. Prerequisite: consent of instructor. Selected topics in (A) Bioinstrumentation and Signal Processing; (B) Biomedical Imaging; (C) Biofluids and Transport; (D) Orthopedic Biomechanics; (E) Analysis of Human Movement. May be repeated for credit.—I, II, III. (I, II, III.)

290. Seminar (1)
Seminar—1 hour. Seminar in biomedical engineering. (S/U grading only.)

290C. Graduate Research Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in biomedical engineering research. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

299. Research (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Engineering: Chemical Engineering and Materials Science

(College of Engineering)

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Klaus van Benthem, Ph.D., Assistant Professor
David E. Block, Ph.D., Professor *(Chemical Engineering, Viticulture and Enology) Academic Senate Distinguished Teaching Award*
Roger B. Boulton, Ph.D., Professor and Endowed Chair *(Chemical Engineering, Viticulture and Enology)*
Nigel Browning, Ph.D., Professor
Ricardo Castro, Ph.D., Assistant Professor
Stephanie R. Dungan, Ph.D., Professor *(Chemical Engineering, Food Science and Technology)*
Nael El-Farra, Ph.D., Associate Professor
Roland Faller, Ph.D., Professor
Bruce C. Gates, Ph.D., Distinguished Professor
Jeffery C. Gibeling, Ph.D., Professor
Joanna R. Groza, Ph.D., Professor
David G. Howitt, Ph.D., Professor
Sangtae Kim, Ph.D., Associate Professor
Tonya L. Kuhl, Ph.D., Professor
Enrique J. Lavernia, Ph.D., Distinguished Professor
Marjorie L. Longo, Ph.D., Professor
Karen A. McDonald, Ph.D., Professor
Adam Moulé, Ph.D., Assistant Professor
Alexandra Navrotsky, Ph.D., Distinguished Professor and Endowed Chair *(Materials Science and Engineering; Chemistry; Land, Air and Water Resources)*
Ahmet N. Palazoglu, Ph.D., Professor
Ronald J. Phillips, Ph.D., Professor
Robert L. Powell, Ph.D., Professor
Subhash H. Risbud, Ph.D., *Distinguished Professor Distinguished Teaching Award—Graduate/Professional*
William Ristenpart, Ph.D., Assistant Professor
Dewey D.Y. Ryu, Ph.D., Professor
Julie M. Schoenung, Ph.D., Professor
Sabyasachi Sen, Ph.D., Professor
James F. Shackelford, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Pieter Stroeve, Sc.D., Professor *Academic Senate Distinguished Teaching Award*
Yayoi Takamura, Ph.D., Assistant Professor
Spyros Tseregounis, Ph.D., Lecturer SOE

Emeriti Faculty

Brian G. Higgins, Ph.D., Professor Emeritus
Alan P. Jackman, Ph.D., Professor Emeritus
Benjamin J. McCoy, Ph.D., Professor Emeritus
Amiya K. Mukherjee, Ph.D., *Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement, Distinguished Graduate Mentoring Award*
Zuhair A. Munir, Ph.D., Distinguished Professor
Stephen Whitaker, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*

Affiliated Faculty

Mark Asta, Ph.D., Adjunct Professor
Jarek Majewski, Ph.D., Adjunct Professor
Michael Manley, Ph.D., Assistant Adjunct Professor
Koichi Takamura, Ph.D., Adjunct Professor

Dan Thoma, Ph.D., Adjunct Professor
Frank Yaghmaie, Ph.D., Assistant Adjunct Professor

The Department of Chemical Engineering and Materials Science offers five undergraduate programs: Chemical Engineering, Biochemical Engineering, Chemical Engineering/Materials Science and Engineering, Electronic Materials Engineering, and Materials Science and Engineering.

Mission Statement. To advance, through teaching and research programs, the frontiers of chemical engineering, biochemical engineering, and materials science and engineering; to educate students with a sense of professionalism and community; and to serve the public of California through outreach efforts.

Chemical Engineering Undergraduate Program

Chemical engineers apply the principles of chemistry and engineering to produce useful commodities, ranging from fuels to polymers. Chemical engineers are increasingly concerned with chemical and engineering processes related to the environment and food production. They work in diverse areas ranging from integrated circuits to integrated waste management. Preparation for a career in chemical engineering requires an understanding of both engineering and chemical principles to develop proficiency in conceiving, designing, and operating new processes.

The chemical engineering curriculum has been planned to provide a sound knowledge of engineering and chemical sciences so that you may achieve competence in addressing current and future technical problems.

Objectives. The objectives of the program in Chemical Engineering are to educate students in the fundamentals of chemical engineering, balanced with the application of these principles to practical problems; to train them as independent, critical thinkers who can also function effectively in teams; to foster a sense of community, ethical responsibility, and professionalism; to prepare them for careers in industry, government, and academia; to illustrate the necessity for continuing education and self-learning; and to help students to learn to communicate proficiently in written and oral form.

The Chemical Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C	15
Chemistry 2A, 2B, 2C or Chemistry 2AH, 2BH, 2CH	15
Chemistry 128A, 128B, 129A	8
Chemical Engineering and Materials Science 5, 6	6
Chemical Engineering 51	4
Chemical Engineering 80	1
Engineering 45	4
English 3 or University Writing Program 1, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
General Education electives	16
Minimum Lower Division Units	**95**

Options for Junior and Senior Years

The focus in your junior year is on fundamentals, such as thermo-dynamics, fluid mechanics, energy transfer, and mass transfer phenomena. In the senior year, you draw together these fundamentals and apply them in a study of kinetics, process design, and process dynamics and control. The program includes ten units of technical electives, and six units of chemical engineering and materials science electives that allow you to strengthen specific areas in chemical engineering, explore new areas, or pursue new areas of specialization.

Areas of Specialization

The most popular areas of specialization, together with lists of suggested technical electives, are identified and discussed in the following listing. Talk to the instructors of the courses listed regarding possible prerequisites before enrolling.

Suggested Technical Electives

Advanced Materials Processing:
Electrical and Computer Engineering 140A, 140B, 145A, 145B, 146A; Physics 140A, 140B; Materials Science and Engineering 172, 180, 181

Applied Chemistry:
Chemistry 110C, 115, 128C, 129B, 129C, 131, 150; Fiber and Polymer Science 100, 110, 150

Applied Mathematics:
Mathematics 118A, 118B, 118C, 119A, 119B, 121, 128A, 128B, 128C, 131, 135A, 135B, 185A, 185B

Computers and Automation:

Artificial Intelligence and Computer Graphics:
Computer Science and Engineering 170, 175

Numerical Analysis and Optimization:
Applied Science 115, 116, Civil and Environmental Engineering 153; Mathematics 128B, 128C, 168

Automatic Control:
Biological Systems Engineering 165; Electrical and Computer Engineering 150B, 157B; Biological and Agricultural Engineering 165; Mechanical Engineering 172

Environmental Engineering–Air Environment:
Civil and Environmental Engineering 149, 150; Atmospheric Science 121A, 121B, 158; Environmental Science & Policy 110; Environmental Toxicology 101, 102A, 102B, 131

Environmental Engineering–Water Environment:
Chemical Engineering 161A, 161B, 161L; Civil and Environmental Engineering 140, 140L, 148A, 148B; Microbiology 102; Biological Sciences 102, 103; Environmental Science & Policy 110, 150A, 151; Environmental Toxicology 101, 102A, 102B; Soil Science 100, 102, 107; Hydrologic Science 124

Food Process Engineering:
Biological Systems Engineering 132; Food Science and Technology 100A, 100B, 104, 104L

Management and Marketing:
Engineering 190; Agricultural Economics 113, 130, 136

Polymer Science:
Chemistry 108, 128C, 129B, 129C; Fiber and Polymer Science 150; Chemical Engineering 144; Materials Science and Engineering 147

Pre-Biomedical Engineering:
Four to six courses from: Anatomy, Physiology and Cell Biology 100; Biological Sciences 2A, 2B, 2C, 101, 102, 103, 104; Molecular and Cellular Biology 140L, 142, 161; Neurobiology, Physiology, and Behavior 101, 112, 113, 114

Pre-Medical:
Chemistry 128C, 129B, 129C; and six biology or biochemistry courses, such as Biological Sciences 2B, 2C, 101, 103, 104; Microbiology 102; Molecular and Cellular Biology 140L, 142, 150, 161: Neurobiology, Physiology, and Behavior 101, 112, 113, 114

Chemical Engineering Upper Division Required Courses

Chemical Engineering 140, 141, 142, 143, 146, 152A, 152B, 155A, 155B, 157, 158A, 158B, 158C	52
Chemistry 110A, 110B	8
Biological Sciences 102	3
Chemical Engineering and Materials Science Electives	6
Choose from the following: Chemistry 110C, 128C, 129B, 129C, 130A, 130B; Chemical Engineering 144, 160, 161A, 161B, 161L, 166, 170; Materials Science and Engineering 147, 160, 164, 181; Fiber and Polymer Science 150.	
Technical Elective	10
General Education electives	8
Minimum Upper Division Units	**87**
Minimum Units Required for Major	**182**

Honors Program. An Honors Program is available to qualified students in the Chemical Engineering, Biochemical Engineering, and Materials Science and Engineering majors. The Honors Program is also available to the dual majors: Chemical Engineering/Materials Science and Electronic Materials Engineering, and Mechanical Engineering/Materials Science and Engineering. The Chemical Engineering and Materials Science Honors Program is a four-year program designed to challenge the most talented students in these majors. Students invited to participate will take a one-unit honors seminar in their freshman year and will enroll in various one-unit honors courses. In the upper division, students will complete either an honors thesis or a project that might involve local industry (Chemical engineering 194 HA, HB, HC). Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

Chemical Engineering/Materials Science and Engineering Undergraduate Program

The Chemical Engineering/Materials Science Program is a combined major that offers unique interdisciplinary courses requiring chemical engineering and materials science students to work together. Chemical engineers apply the principles of chemistry and engineering to produce useful commodities, ranging from antibiotics to zirconium. Materials science and engineering is directed toward an understanding of the structure, properties, and behavior of materials. The development of new materials and the understanding of chemical processes demand a thorough knowledge of basic engineering and scientific principles, including crystal structure, elastic and plastic behavior, thermodynamics, phase equilibria and reaction rates, and physical and chemical behavior of engineering materials. The Chemical Engineering/Materials Science program provides the background for activities in research, processing, and the design of materials. The curriculum is based on a common core of courses basic to engineering; courses taken during your first two years provide a strong foundation in fundamental engineering concepts.

The Chemical Engineering/Materials Science and Engineering program is not accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C	15
Chemistry 2A, 2B, 2C or Chemistry 2AH, 2BH, 2CH	15
Chemistry 128A, 128B, 129A	8
Chemical Engineering and Materials Science 5, 6	6

Chemical Engineering 51 4
Chemical Engineering 80 1
Engineering 45 4
English 3 or University Writing Program 1, Comparative Literature 1, 2, 3, or 4 or Native American Studies 5 4
General Education electives 16
Total Lower Division Units 95

Upper Division Required Courses

Chemical Engineering 140, 141, 142, 143, 146, 152A, 152B, 155A, 155B, 157, 158A, 158B, 158C 52
Chemistry 110A, 110B 8
Biological Sciences 102 3
Materials Science and Engineering 160, 162, 162L, 164, and a minimum of 8 units of course work to be chosen from Materials Science and Engineering 147, 172, 172L 174, 174L 180, 181, 182, 188A-B 22
General Education electives 8
Minimum Upper Division Units 93

Minimum Units Required for Major 188

Honors Program. An Honors Program is available to qualified students in the Chemical Engineering, Biochemical Engineering, and Materials Science and Engineering majors. The Honors Program is also available to the dual majors: Chemical Engineering/Materials Science and Electrical Engineering/Materials Science and Engineering, and Mechanical Engineering/Materials Science and Engineering. The Chemical Engineering and Materials Science Honors Program is a four-year program designed to challenge the most talented students in these majors. Students invited to participate will take a one-unit honors seminar in their Freshman year and will enroll in various one-unit honors courses. In the upper division, students will complete either an honors thesis or a project that might involve local industry (Chemical Engineering 194 HA, HB, HC). Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

Biochemical Engineering Undergraduate Program

As the biotechnology industry expands and matures, there is increasing need for engineers who can move products from the research stage to large scale manufacturing. As they fill this need, engineers must also understand the production, purification, and regulatory issues surrounding biopharmaceutical manufacturing.

Biochemical engineers-with their strong foundations in chemistry, biological sciences, and chemical process engineering-are in a unique position to tackle these problems. Biochemical engineers apply the principles of cell and molecular biology, biochemistry, and engineering to develop, design, scale-up, optimize, and operate processes that use living cells, organisms, or biological molecules for the production and purification of products (such as monoclonal antibodies, vaccines, therapeutic proteins, antibiotics, and industrial enzymes); for health and/or environmental monitoring (such as diagnostic kits, microarrays, biosensors); or for environmental improvement (such as bioremediation). An understanding of biological processes is also becoming increasingly important in the industries that traditionally employ chemical engineers, such as the materials, chemicals, food, energy, fuels, and semiconductor processing industries.

Objectives. We educate students in the fundamentals of chemical and biochemical engineering, balanced with the application of these principles to practical problems; educate students as independent, critical thinkers who can also function effectively in a team; educate students with a sense of community, ethical responsibility, and professionalism; educate students for careers in industry, government, and academia; teach students the necessity for continuing education and self learning; and foster proficiency in written and oral communications.

The Biochemical Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Lower Division Required Courses

UNITS

Mathematics 21A-21B-21C-21D 16
Mathematics 22A-22B 6
Physics 9A-9B-9C 15
Chemistry 2A, 2B, 2C or Chemistry 2AH, 2BH, 2CH 15
Chemistry 128A, 128B, 129A 8
Biological Sciences 2A 4
Chemical Engineering and Materials Science 5, 6 6
Chemical Engineering 51 4
Chemical Engineering 80 1
English 3 or University Writing Program 1, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5 4
General Education electives 16
Minimum Lower Division Units 95

Upper Division Required Courses

Chemical Engineering 140, 141, 142, 143, 146, 152A, 152B, 155A, 157, 158A, 158C, 161A, 161B, 161C, 161L 60
Biological Sciences 102 3
Microbiology 102 4
Chemistry 110A 4
Biochemical Engineering electives 10
Choose two laboratory courses from the laboratory electives list, and choose additional courses from the lecture elective list to provide a total of at least 10 units:
Laboratory elective list:
Biomedical Engineering 161L; Biotechnology 161A, 161B; Food Science and Technology 123L; Microbiology 102L, 155L; Molecular and Cellular Biology 120L (this course counts as two laboratory electives and completely satisfies the laboratory requirement), 160L; Neurobiology, Physiology, and Behavior 104L; Plant Sciences 153; two units of an internship (192), independent study (199), or Biotechnology 189L taken for 2 or more units can be used to satisfy one biochemical engineering laboratory elective requirement with the approval of a petition, provided that the course is a laboratory-based experimental project, related to the biological and/or biochemical engineering sciences, and the student submits a written report that demonstrates proficiency in laboratory skills, techniques, or method.
Lecture elective list:
Biological Sciences Applied Science 172; Biological Sciences 2B, 2C, 101, 103, 104; Biological Systems Engineering 160, 175; Biomedical Engineering 102, 107, 109, 117, 140, 162; Biotechnology 160, 188; Chemical Engineering 170; Chemistry 130A, 130B; Food Science and Technology 123; Microbiology 140, 150; Molecular and Cellular Biology 122, 123; Neurobiology, Physiology, and Behavior 103; Plant Biology 111, 112; Plant Sciences 152; Statistics 120, 130A, 131A.
General Education electives 8
Minimum Upper Division Units 89

Minimum Units Required for Major 184

Honors Program. An Honors Program is available to qualified students in the Chemical Engineering, Biochemical Engineering, and Materials Science and Engineering majors. The Honors Program is also available to the dual majors: Chemical Engineering/Materials Science and Electrical Engineering/Materials Science and Engineering, and Mechanical Engineering/Materials Science and Engineering. The Chemical Engineering and Materials Science Honors Program is a four-year program designed to challenge the most talented students in these majors. Students invited to participate will take a one-unit honors seminar in their Freshman year and will enroll in various one-unit honors courses. In the upper division, students will complete either an honors thesis or a project that might involve local industry (Chemical Engineering 194 HA, HB, HC). Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript

Materials Science and Engineering Undergraduate Program

Materials science and engineering is directed toward an understanding of the structure, properties, and behavior of materials. Society demands new and improved materials with capabilities far superior to common metals, polymers, and ceramics. New materials are needed for high-speed transportation systems, surgical and dental implants, new generations of power plants, and solid-state electronic devices in computer and communication technology. Both the development of new materials and the understanding of present-day materials demand a thorough knowledge of basic engineering and scientific principles, including crystal structure, elastic and plastic behavior, thermodynamics, phase equilibria and reaction rates, and physical and chemical behavior of engineering materials.

Materials engineers study phenomena found in many different engineering operations, from fracture behavior in automobiles to fatigue behavior in aircraft frames; from corrosion behavior in petro-chemical refineries to radiation-induced damage in nuclear power plants; and from the fabrication of steel to the design of semiconductors. Materials engineers are also increasingly involved in developing the new materials needed to attain higher efficiencies in existing and proposed energy conversion schemes and will play a central role in the development of new technologies based on composites and high-temperature superconductivity.

The undergraduate materials science and engineering program provides the background for activities in research, processing, and the design of materials. The curriculum is based on a common core of courses basic to engineering; courses taken during your first two years provide a strong foundation in fundamental engineering concepts.

There are several combined majors with Materials Science and Engineering: Chemical Engineering/Materials Science and Engineering; Electronic Materials Engineering; and Mechanical Engineering/Materials Science and Engineering.

Objectives. We educate students in the fundamentals of materials science and engineering, balanced with the application of these principles to practical problems; educate students as independent, critical thinkers who can also function effectively in a team; educate students with a sense of community, ethical responsibility, and professionalism; educate students for careers in industry, government, and academia; teach students the necessity for continuing education and self-learning; and foster proficiency in written and oral communications.

The Materials Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Lower Division Required Courses

UNITS

Mathematics 21A-21B-21C-21D 16
Mathematics 22A-22B 6
Physics 9A-9B-9C-9D 19
Chemistry 2A, 2B or 2AH, 2BH 10
Engineering 6, 17, 35, 45 15

English 3 or University Writing Program 1 or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5, ... 4
Communication 1 or 3..... 4
General Education electives..... 16
Minimum Lower Division Units 90

Upper Division Requirements:

In your third and fourth years, you will take "fundamentals" courses (Materials Science and Engineering 160, 162, 164, 172, 174). With this background, you are then ready for the "applications" courses (Materials Science and Engineering 147, 180, 181, 182, 188AB) during the fourth year.

If you need a technical elective course in your program, you may select it from the College list of Technical Electives.

Upper Division Required Courses

Engineering 100, 102, 103, 104, 105, 190..... 22
Select from Aeronautical Science and Engineering 137, 138, Civil and Environmental Engineering 132, 135, Mechanical Engineering 150A, 150B 8
Materials Science and Engineering 147, 160, 162, 162L, 164, 172, 172L, 174, 174L, 180, 181, 182, 188A, 188B 45
Select one course from Engineering 180, Mathematics 135A, Statistics 120, 131A, Civil and Environmental Engineering 114, Chemical Engineering 140, or Applied Science Engineering 115..... 4
Select one course from Chemistry 110A, 128A, Physics 121 or Geology 161..... 3 or 4
General Education electives..... 8
Minimum Upper Division Units 90

Minimum Units Required for Major 180

Honors Program. An Honors Program is available to qualified students in the Chemical Engineering, Biochemical Engineering, and Materials Science and Engineering majors. The Honors Program is also available to the dual majors: Chemical Engineering/Materials Science and Electronic Materials Engineering, and Mechanical Engineering/Materials Science and Engineering. The Chemical Engineering and Materials Science Honors Program is a four-year program designed to challenge the most talented students in these majors. Students invited to participate will take a one-unit honors seminar in their Freshman year and will enroll in various one-unit honors courses. In the upper division, students will complete either an honors thesis or a project that might involve local industry (Chemical Engineering 194 HA, HB, HC). Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

Electrical Engineering/Materials Science and Engineering Undergraduate Program

This program is no longer open for admission. See Electronic Materials Engineering Undergraduate Program, on page 249.

The Electrical Engineering/Materials Science and Engineering Program is a combined major, including portions of the Electrical Engineering curriculum in the Department of Electrical and Computer Engineering and the Materials Science curriculum in the Department of Chemical Engineering and Materials Science. In the past decade, the fields of solid-state electronics, opto-electronics, magnetics, and superconductors have developed to the point that demand for new materials now sets the pace for progress in these fields. Materials scientists with an electronics background are key to continued progress in these areas. The Electrical Engineering/Materials Science and Engineering curriculum provides students with the background necessary to pursue careers in electrical engineering or materials science or to go on to graduate study.

Objectives. The Electrical Engineering/Materials Science and Engineering program has adopted the following objectives to serve the long-term interests of our students and the industries of Northern California and the nation. Foundation-To provide our graduates with a solid foundation in engineering science, including mathematics, physical science, and the fundamentals of electrical engineering and materials science and engineering. This foundation is necessary to succeed in more advanced engineering courses and to be able to continue learning throughout a career. Breadth-To provide our graduates with sufficient breadth in electrical engineering and materials science and engineering. This breadth is required for students to understand engineering tradeoffs that cross disciplines, for them to contribute effectively to multi-disciplinary projects and for them to make an informed decision about their area of study. Depth-To provide our graduates with sufficient depth in a specific area of electrical engineering and materials science and engineering. This depth is necessary to solve complex real-world engineering problems and to prepare to contribute to a specific discipline within electrical engineering and materials science and engineering. Ethics-To provide our graduates with a basic understanding of, and ability to handle correctly, ethical problems that may arise during their careers. To provide them with an understanding of their obligations to society at large.

The Electronic Materials Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Lower Division Required Courses

Mathematics 21A-21B-21C-21D..... 16
Mathematics 22A-22B..... 6
Physics 9A-9B-9C-9D..... 19
Chemistry 2A-2B or 2AH, 2BH..... 10
Computer Science Engineering 30..... 4
Engineering 6, 17, 35, 45..... 15
English 3 or University Writing Program 1, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5..... 4
Communication 1 or 3..... 4
General Education electives 16
Minimum Lower Division Units 94

Upper Division Required Courses

Electrical and Computer Engineering 100, 110A, 110B, 130A, 130B, 140A, 140B, 146A 32
Electrical and Computer Engineering 100, 110A, 110B, 130A, 130B, 140A, 140B, 146A 32
Materials Science and Engineering 160, 162, 162L, 164, 172, 172L, 174, 181, 188A, 188B 32
Statistics 120, 131A, Mathematics 135A, or Civil and Environmental Engineering 114 4
Engineering 190..... 3
Electronic Materials elective 3
Electrical and Computer Engineering 106, 112, 118, 132A, 133, 135, 136A-B, 146B, 150A, 151, 157A, 160, 166, 170, 172, 180A, 180B, 194A-194B-194C (must be taken in consecutive quarters to count as one design elective), 195A-195B (must be taken in consecutive quarters to count as one design elective); Engineering 105; Materials Science and Engineering 180, 182.
General Education electives 8
Unrestricted electives..... 4
Minimum Upper Division Units 86

Minimum Units Required for Major 180

Honors Program. An Honors Program is available to qualified students in the Chemical Engineering, Biochemical Engineering, and Materials Science and Engineering majors. The Honors Program is also available to the dual majors: Chemical Engineering/Materials Science and Electrical Engineering/Materials Science and Engineering, and Mechanical Engineering/Materials Science and Engineering. The Chemical Engineering and Materials Science Honors Program is a four-year program designed to challenge the most talented students in these majors. Students invited to participate will take a one-unit honors seminar in their Freshman year and will enroll in various one-unit honors courses. In the upper division, students will complete either an honors thesis or a project that might involve local industry (Chemical Engineering 194 HA, HB, HC). Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

Electronic Materials Engineering Undergraduate Program

The Electronic Materials Engineering Program is a combined major, including portions of the Electrical Engineering curriculum in the Department of Electrical and Computer Engineering and the Materials Science curriculum in the Department of Chemical Engineering and Materials Science. In the past decade, the fields of solid-state electronics, opto-electronics, magnetics, and superconductors have developed to the point that demand for new materials now sets the pace for progress in these fields. Materials scientists with an electronics background are key to continued progress in these areas. The Electronics Materials Engineering curriculum provides students with the background necessary to pursue careers in electrical engineering or materials science or to go on to graduate study.

Objectives. The Electronic Materials Engineering program has adopted the following objectives to serve the long-term interests of our students and the industries of Northern California and the nation. Foundation-To provide our graduates with a solid foundation in engineering science, including mathematics, physical science, and the fundamentals of electrical engineering and materials science and engineering. This foundation is necessary to succeed in more advanced engineering courses and to be able to continue learning throughout a career. Breadth-To provide our graduates with sufficient breadth in electrical engineering and materials science and engineering. This breadth is required for students to understand engineering tradeoffs that cross disciplines, for them to contribute effectively to multi-disciplinary projects and for them to make an informed decision about their area of study. Depth-To provide our graduates with sufficient depth in a specific area of electrical engineering and materials science and engineering. This depth is necessary to solve complex real-world engineering problems and to prepare to contribute to a specific discipline within electrical engineering and materials science and engineering. Ethics-To provide our graduates with a basic understanding of, and ability to handle correctly, ethical problems that may arise during their careers. To provide them with an understanding of their obligations to society at large.

The Electronic Materials Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C-9D	19
Chemistry 2A-2B or 2AH, 2BH	10
Computer Science Engineering 30	4
Engineering 6, 17, 35, 45	15
English 3 or University Writing Program 1, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
Communication 1 or 3	4

General Education electives.....12
Minimum Lower Division Units 99

Upper Division Required Courses

Electrical and Computer Engineering 100, 110A, 110B, 130A, 130B, 140A, 140B, 146A.....32
Materials Science and Engineering 160, 162, 162L, 164, 172, 172L, 174, 181, 188A, 188B.....32
Statistics 120, 131A, Mathematics 135A, or Civil and Environmental Engineering 114.....4
Engineering 190 3
Electronic Materials elective.....3
Electrical and Computer Engineering 106, 112, 118, 132A, 133, 135, 136A-B, 146B, 150A, 151, 157A, 160, 166, 170, 172, 180A, 180B, 194A-194B-194C (must be taken in consecutive quarters to count as one design elective), 195A-195B (must be taken in consecutive quarters to count as one design elective); Engineering 105; Materials Science and Engineering 180, 182.
General Education electives.....12
Unrestricted electives 4
Minimum Upper Division Units 90

Minimum Units Required for Major..... 180

Honors Program. An Honors Program is available to qualified students in the Chemical Engineering, Biochemical Engineering, and Materials Science and Engineering majors. The Honors Program is also available to the dual majors: Chemical Engineering/Materials Science and Electronic Materials Engineering, and Mechanical Engineering/Materials Science and Engineering. The Chemical Engineering and Materials Science Honors Program is a four-year program designed to challenge the most talented students in these majors. Students invited to participate will take a one-unit honors seminar in their Freshman year and will enroll in various one-unit honors courses. In the upper division, students will complete either an honors thesis or a project that might involve local industry (Chemical Engineering 194 HA, HB, HC). Students must maintain a grade point average of 3.500 to continue in the program. Successful completion of the Honors Program will be acknowledged on the student's transcript.

The Graduate Program in Chemical Engineering

M.S. and Ph.D. in Chemical Engineering
Designated Ph.D. emphasis available in Biotechnology
Designated Ph.D. emphasis available in Biophotonics
http://chms.engineering.ucdavis.edu
(530) 752-7952

Our graduate students benefit from the combined faculty expertise and laboratory facilities of two dynamic disciplines—chemical engineering and materials science. A coordinated and highly multidisciplinary approach in this blended department translates into broader preparation for all of our students.

Chemical engineers apply chemistry and engineering principles to industrial processes, thus altering the state, chemical composition and microstructure of materials to create products in such diverse industries as petroleum, food, pharmaceuticals, chemicals and semiconductors.

Both chemical engineering and materials science focus on integrating products and product design with the environment. The interdisciplinary activities of department faculty receive strong external funding in materials synthesis and processing, biochemical/biomaterials, including polymers, with increasing activity in nanophases research as well.

We embrace diversity in our programs; approximately 50% of our graduate students are women, while overall, the College of Engineering has been rated among the top ten schools nationwide for the number of female faculty. We are able to recruit and engage highly qualified students overall.

We promote an environment that nurtures and promotes collegial interaction between graduate students and faculty in an environment where graduate students are viewed as junior faculty. The department is committed to providing ample dissertation/thesis advising and financial support for students focused on making progress towards their advanced degree objectives.

Generous financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid.

Research Highlights:

- Biotechnology, Biochemical and Biomolecular Engineering
- Biomimetic Thin Films/Biomaterials
- Molecular Modeling
- Membrane Biophysics
- Transport Phenomena
- Separation Processes
- Rheology
- Catalysis
- Process Design and Control
- Analytical Techniques in Electron Microscopy
- Solid Oxide Fuel Cells
- Properties of Glasses and Ceramics
- Thermochemistry/Calorimetry and Kinetics of Materials Synthesis
- Colloid, Polymer and Surface Science
- Green Engineering

Research Facilities:

- Interdisciplinary Center for Electron Microscopy
- Northern California Nanotechnology Center
- Center for Nanomaterials in the Environment, Agriculture and Technology

Complete Information on our website.

The Graduate Program in Materials Science and Engineering

M. Eng, M.S. and Ph.D. in Materials Science and Engineering
Designated Ph.D. emphasis available in Biotechnology
Designated Ph.D. emphasis available in Biophotonics
http://chms.engineering.ucdavis.edu
(530) 752-7952

Our graduate students in materials science benefit from the combined faculty expertise and laboratory facilities of two dynamic disciplines-chemical engineering and materials science. A coordinated and highly multidisciplinary approach in this blended department translates into broader preparation for all of our students.

Materials science focuses on the synthesis, processing, characterization, structural and property relations of new and existing materials. Both chemical engineering and materials science focus on integrating products and product design into the environment. The interdisciplinary activities of department faculty receive strong external funding in materials synthesis and processing, biochemical/biomaterials, including polymers, with increasing activity in nanophases research as well.

We embrace diversity in our programs; approximately 50% of our graduate students are women, while overall, the College of Engineering has been rated among the top ten schools nationwide for the number of female faculty. We are able to recruit and engage highly qualified students overall.

We promote an environment that nurtures and promotes collegial interaction between graduate students and faculty in an environment where graduate students are viewed as junior faculty. The department is committed to providing ample dissertation/thesis advising and financial support for students focused on making progress towards their advanced degree objectives.

Generous financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid.

Research Highlights:

- Biomimetic Thin Films
- Molecular Modeling
- Synthesis of Advanced Materials
- Biomaterials
- Forensics
- Analytical Techniques in Electron Microscopy
- Solid Oxide Fuel Cells
- Properties of Glasses and Ceramics
- Computational Materials Science
- Thermochemistry/Calorimetry and Kinetics of Materials Synthesis
- Properties and Processing of Nanomaterials
- Growth and Characterization of Thin Films
- Colloid, Polymer and Surface Science
- Fracture and Fatigue of Solids and Superplasticity in Metals and Ceramics
- Industrial Ecology and Pollution Prevention

Research Facilities and Partnerships:

- Interdisciplinary Center for Electron Microscopy
- Center for Northern California Nanotechnology
- Center for Nanomaterials in the Environment, Agriculture and Technology

Complete Information on our website.

Courses in Engineering: Chemical and Materials Science (ECM)

Courses in Chemical and Materials Science Engineering (ECM) are listed below; courses in Chemical Engineering (ECH) are listed immediately following; courses in Materials Science and Engineering (EMS) follow.

Lower Division Courses

5. Analysis in Biochemical, Chemical and Materials Engineering (2)
Lecture/discussion—2 hours. Prerequisite: Chemistry 2B (may be taken concurrently), Mathematics 21B (may be taken concurrently). Analysis of systems of interest to chemical engineers and materials scientists. Applications of differential and integral calculus. Dimensional analysis.—II. (II.)

6. Computational Methods for Bio/Chemical/Materials Engineers (4)
Lecture/discussion—4 hours. Prerequisite: Mathematics 21C and course 5. Programming methods for solving problems in chemical, biochemical and materials engineering using Mathematica. Programming styles, data structures, working with lists, functions and rules. Applications drawn from material balances, statistics, numerical methods, and bioinformatics. Introduction to object oriented programming using Java.—III. (III.)

6H. Honors Materials Science Computer Applications (1)
Discussion—1 hour. Prerequisite: enrollment in the Materials Science and Engineering Honors Program; concurrent enrollment in Engineering 6 required. Examination of materials science computer applications through additional readings, discussions, collaborative work, or special activities which may include projects or computer simulations. Open only to students in the Materials Science and Engineering Honors program.—II. (II.)

9H. Honors Solid-State Materials Science (1)
Discussion—1 hour. Prerequisite: enrollment in the Materials Science and Engineering Honors Program; concurrent enrollment in Physics 9D required. Examination of solid-state materials science and modern

physics topics through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Open only to students in the Materials Science and Engineering Honors program.—III. (III.)

90X. Honors Discussion Section (1)
Discussion—1 hour. Prerequisite: open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs. Examination of special topics covered in selected lower-division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. May be repeated for credit when topic differs.—II, III.

94H. Honors Seminar (1)
Seminar—1 hour. Prerequisite: open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs. Examination of selected current topics in chemical or biochemical engineering through readings, discussions, collaborative work or special activities which may include projects, laboratory experiences or computer simulations.—I. (I.)

Upper Division Courses

188H. Honors Materials Design (1)
Discussion—1 hour. Prerequisite: enrollment in the Materials Science and Engineering Honors Program. Examination of special topics covered in the materials design course through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Open only to students in the Materials Science and Engineering Honors program.—II. (II.)

188BH. Honors Materials Design (1)
Discussion—1 hour. Prerequisite: enrollment in the Materials Science and Engineering Honors Program. Examination of special topics covered in the materials design course through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. Open only to students in the Materials Science and Engineering Honors Program.—III. (III.)

190X. Honors Discussion Section (1)
Discussion—1 hour. Prerequisite: open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs. Examination of special topics covered in selected upper division courses through additional readings, discussions, collaborative work, or special activities which may include projects, laboratory experience or computer simulations. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

194HA. Special Study for Honors Students (2)
Independent study—6 hours. Prerequisite: open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs. Guided independent study of a selected topic in Chemical Engineering or Biochemical Engineering. Preparation for course 194HB.—I, II, III. (I, II, III.)

194HB. Special Study for Honors Students (1-5)
Prerequisite: course 194HA; open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs. Guided independent study of a selected topic in Chemical Engineering or Biochemical Engineering. Preparation for course 194HC. May be repeated for credit.—I, II, III. (I, II, III.)

194HC. Special Study for Honors Students (1-5)
Prerequisite: course 194HB; open only to students enrolled in the Chemical Engineering or Biochemical Engineering Honors programs. Guided independent study of a selected topic in Chemical Engineering or Biochemical Engineering leading to the presentation of an honors project or thesis, under the supervision of a faculty adviser.—I, II, III. (I, II, III.)

Graduate Courses

261. Molecular Modelling of Soft and Biological Matter (4)
Lecture/discussion—4 hours. Prerequisite: Materials Science and Engineering 247 or Engineering: Chemical 252 or equivalent course in advanced thermodynamics/statistical mechanics. Modern molecular simulation techniques with a focus on soft matter like polymers, biologically relevant systems, and glasses. Offered in alternate years.—II. Faller

268. Process Monitoring and Data Analysis (3)
Lecture—3 hours. Prerequisite: senior or graduate standing in engineering or physical sciences or consent of instructor. Analytical approaches to the proper management of experimental and process system data, ranging from univariate and multivariate statistical methods to neural networks, wavelets and Markov models. Offered in alternate years.—III. Palazoglu

280. Seminar in Ethics for Scientists (2)
Seminar—2 hours. Prerequisite: graduate standing in any department of Science or Engineering. Studies of topical and historical issues in the ethics of science, possibly including issues such as proper authorship, peer review, fraud, plagiarism, responsible collaboration, and conflict of interest. Limited enrollment. (Same course as Chemistry 280 and Physics 280.) (S/U grading only.)—III. (III.)

281. Green Engineering: Theory and Practice (3)
Lecture/discussion—3 hours. Prerequisite: graduate standing in Engineering or consent of instructor. Methods of evaluating alternative technologies, processes, materials, chemicals, and/or products relative to pollution, waste, toxic substance use, and sustainability. Topics include environmental regulations, recycling, life-cycle assessment, economic analysis, design for the environment, green chemistry and toxicology. Offered in alternate years.—II. Schoenung

290. Chemical Engineering & Materials Science Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Selected topics of current interest in Chemical Engineering and Materials Science Engineering. The subjects covered will vary from year to year and will be announced at the beginning of each quarter. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Courses in Engineering: Chemical (ECH)

Lower Division Courses

51. Material Balances (4)
Lecture—4 hours. Prerequisite: Mathematics 21D. Application of the principle of conservation of mass to single and multicomponent systems in chemical process calculations. Studies of batch, semi-batch, and continuous processes involving mass transfer, change of phase, stoichiometry and chemical reaction. Not open for credit to students who have completed course 151.—II. (II.)

80. Chemical Engineering Profession (1)
Lecture/discussion—1 hour. Professional opportunities and professional responsibilities of chemical engineers. Opportunities and needs for post-baccalaureate education. Relationship of chemical engineering to contemporary issues.—III. (III.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

140. Mathematical Methods in Biochemical and Chemical Engineering (4)
Lecture/discussion—4 hours. Prerequisite: Mathematics 22B. Mathematical methods for solving problems in chemical and biochemical engineering, with emphasis on transport phenomena. Fourier series and separation of variables. Sturm-Liouville eigenvalue problems. Similarity transformations. Tensor analysis. Finite difference methods for solving time-dependent diffusion problems. Not open for credit to students who have completed course 159.—I. (I.)

141. Fluid Mechanics for Biochemical and Chemical Engineers (4)
Lecture/discussion—4 hours. Prerequisite: Course 140. Principles and applications of fluid mechanics in chemical and biochemical engineering. Hydrostatics. The stress tensor and Newton's law of viscosity. Derivation of the Navier-Stokes equations from Euler's laws of mechanics. One-dimensional laminar and turbulent flows. Macroscopic momentum and mechanical energy balances. Boundary layer theory. Low Reynolds number flow. Not open for credit to students who have completed course 150B.—II. (II.)

142. Heat Transfer for Biochemical and Chemical Engineers (4)
Lecture/discussion—4 hours. Prerequisite: course 51 with a C- or better, course 141. Conduction, convection, and radiation of thermal energy in applications to chemical and biochemical engineering. Derivation of thermal and mechanical energy equations. Thermal boundary layers. Macroscopic balances. Applications: heat transfer in tubes, channels, and integrated circuits, and analysis of heat exchangers. Not open for credit to students who have completed course 153.—III. (III.)

143. Mass Transfer for Biochemical and Chemical Engineers (4)
Lecture/discussion—4 hours. Prerequisite: course 51 with a C- or better, course 141. Derivation of species conservation equations describing convective and diffusive mass transfer. Fick's law and the Stefan-Maxwell constitutive equations. Mass transfer coefficients. Multicomponent mass transfer across gas/liquid interfaces. Applications include drying, heterogeneous chemical reactions, and membrane separations.—III. (III.)

144. Rheology and Polymer Processing (3)
Lecture/Discussion—3 hours. Prerequisite: Course 141. Deformation in steady shear, unsteady shear, and elongational flows. Linear and non-linear viscoelastic constitutive models. The principle of material indifference and admissibility of constitutive equations. Introduction to the unit operations of polymer processing. Not open for credit to students who have completed course 150C.—III. (III.)

146. Chemical Kinetics and Reaction Engineering (5)
Lecture/discussion—5 hours. Prerequisite: Course 143 and 152B. Application of principles of kinetics, heat, and mass transfer to the analysis and design of chemical reaction systems. Not open for credit to students who have completed course 156B.—II. (II.)

152A. Chemical Engineering Thermodynamics (3)
Lecture—3 hours. Prerequisite: course 51. Application of principles of thermodynamics to chemical processes. Not open for credit to students who have completed Engineering 105 or 105A.—II. (II.)

152B. Chemical Engineering Thermodynamics (4)
Lecture/discussion—4 hour. Prerequisite: course 152A. Continuation of course 152A. Not open for credit to students who have completed Engineering 105.—III. (III.)

155A. Chemical Engineering Laboratory (4)
Laboratory—6 hours; discussion—1 hour; term paper. Prerequisite: courses 141, 142, and 143 (may be taken concurrently); satisfaction of the upper division English composition requirement. Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, and Biological Systems Engineering. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: Wrt.—I, II. (I, II.)

155B. Chemical Engineering Laboratory (4)
Laboratory—6 hours; discussion—1 hour; extensive writing—1 hour. Prerequisite: courses 143 (may be taken concurrently), 155A; satisfaction of the upper division English composition requirement. Open only to majors in Chemical Engineering, Chemical Engineering/Materials Science, Biochemical Engineering, Biomedical Engineering, Food Engineering, and Biosystems Engineering. Continuation of course 155A. Laboratory experiments in transport phenomena, chemical kinetics, and thermodynamics. GE credit: Wrt.—II, III. (II, III.)

157. Process Dynamics and Control (4)
Lecture/discussion—4 hours. Prerequisite: course 140. Fundamentals of dynamics and modeling of chemical processes. Design and analysis of feedback control of chemical processes.—I. (I.)

158A. Process Design and Analysis I (4)
Lecture—4 hours. Prerequisite: courses 142 and 143. Process and product creation and design. Cost accounting and estimation. Profitability analysis techniques. Optimization of process flowsheets.—I. (I.)

158B. Process Design and Analysis II (4)
Lecture—4 hours. Prerequisite: course 158A. Heuristic and rigorous design of chemical process equipment. Synthesis of reactor and separation networks, heat and power integration.—II. (II.)

158C. Plant Design Project (4)
Laboratory/discussion—2 hours; project. Prerequisite: course 158B or 161C. Conceptual design of chemical and biochemical processes. Design, costing and profitability analysis of complete plants. Use of computer-aided design techniques.—III. (III.)

160. Fundamentals of Biomanufacturing (3)
Lecture—3 hours. Prerequisite: Microbiology 102, Biological Sciences 102 or Animal Biology 102. Principles of large scale bioreactor production of metabolites, enzymes, and recombinant proteins including the development of strains/cell lines, fermentor/bioreactor design, monitoring and operation, product recovery and purification, and biomanufacturing economics. Not open for credit to students who have completed course 161C or both 161A and 161B; only two units of credit to students who have completed either course 161A or 161B.—McDonald

161A. Biochemical Engineering Fundamentals (4)
Lecture/discussion—4 hours. Prerequisite: Chemistry 128A, Mathematics 22B, Microbiology 102 (or consent of instructor). Biokinetics; bioreactor design and operation; transport phenomena in bioreactors; microbial, plant, and animal cell cultures.—II. (II.)

161B. Bioseparations (4)
Lecture/discussion—4 hours. Prerequisite: course 143. Product recovery and purification of biochemicals. Cell disruption, centrifugation, filtration, membrane separations, extraction, and chromatographic separation.—II. (II.)

161C. Biotechnology Facility Design and Regulatory Compliance (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 161A, 161B (may be taken concurrently). Design of biotechnology manufacturing facilities. Fermentation and purification equipment, and utility systems. Introduction to current good manufacturing practices, regulatory compliance, and documentation.—II. (II.) Block

161L. Bioprocess Engineering Laboratory (4)
Laboratory—9 hours; discussion—1 hour; term paper. Prerequisite: course 161A and 161B, or Viticulture and Enology 186, or Biological Sciences 103 and Molecular and Cellular Biology 120L. Restricted to chemical/biochemical engineering majors during pass 1. Laboratory experiments in the operation and analysis of bioreactors; determination of oxygen mass transfer coefficients in bioreactors and ion exchange chromatography. GE credit: Wrt.—III.

166. Catalysis (3)
Lecture—3 hours. Prerequisite: course 146 (may be taken concurrently) or consent of instructor. Principles of catalysis based on an integration of principles of physical, organic, and inorganic chemistry and chemical kinetics and chemical reaction engineering. Catalysis in solution; catalysis by enzymes; catalysis in swellable polymers; catalysis in microscopic cages (zeolites); catalysis on surfaces.—II. (II.) Gates

170. Introduction to Colloid and Surface Phenomena (3)
Lecture—3 hours. Prerequisite: Chemistry 110A. Introduction to the behavior of surfaces and disperse systems. The fundamentals will be applied to the solution of practical problems in colloid science. The course should be of value to engineers, chemists, biologists, soil scientists, and related disciplines.—III. (III.) Stroeve

190C. Research Group Conferences (1)
Discussion—1 hour. Prerequisite: upper division standing in Chemical Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

190X. Upper Division Seminar (1)
Seminar—1 hour. Prerequisite: upper division standing. In-depth examination of a special topic in a small group setting.

198. Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

206. Biochemical Engineering (3)
Lecture—3 hours. Prerequisite: Microbiology 102 and 102L, Biological Sciences 101, 102, 103, Molecular and Cellular Biology 120L, 200A; Food Science and Technology 205 recommended; or consent of instructor. Interaction of chemical engineering, biochemistry, and microbiology. Mathematical representations of microbial systems. Kinetics of growth, death, and metabolism. Continuous fermentation, agitation, mass transfer and scale-up in fermentation systems, product recovery, enzyme technology. Offered in alternate years.—(II.) Ryu

226. Enzyme Engineering (3)
Lecture—3 hours. Prerequisite: Microbiology 102 and 102L, Biological Sciences 102, 103, Molecular and Cellular Biology 122, 120L, 200A; or consent of instructor. Application of basic biochemical and engineering principles of practical enzymatic processes. Lectures cover large scale production and separation of enzymes, immobilized enzyme systems, enzyme reactor design and optimization, and new application of enzymes in genetic engineering related biotechnology. Offered in alternate years.—II. Ryu

246. Advanced Biochemical Engineering (2)
Lecture—2 hours. Prerequisite: course 206 or consent of instructor. Advances in the field of biotechnology including genetic engineering, enzyme engineering, fermentation science, and renewable resources development. The important results of original research will be evaluated for understanding of the fundamental principles and for potential practical application.—II. (II.) Ryu

252. Statistical Thermodynamics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 152B, Engineering 105B, or the equivalent. A treatment of the statistical basis of thermodynamics; introduction to statistical mechanics; discussion of the laws of thermodynamics; application of thermodynamic relationships to phase and chemical reaction equilibrium; introduction to molecular simulations and the evaluation of thermodynamic properties from molecular simulations.—I. (I.)

253A. Advanced Fluid Mechanics (4)
Lecture—4 hours. Prerequisite: courses 141 and 259. Kinematics and basic principles of fluid flow. Principles of constitutive equations. Navier-Stokes equations for Newtonian fluids. Survey of rectilinear creeping flow, lubrication flow and boundary layer theory.—I. (I.)

253B. Advanced Heat Transport (4)
Lecture—4 hours. Prerequisite: courses 142 and 259 or the equivalent. Fundamental energy postulates and derivation of microscopic and macroscopic energy equations. Mechanisms of conduction. Isotropic, thermoelastic and anisotropic materials solution problems using Greens functions and perturbation theory.—II. (II.)

253C. Advanced Mass Transfer (4)
Lecture—4 hours. Prerequisite: courses 143 and 259 (may be taken concurrently) or the equivalents. Kinematics and basic conservation principles for multicomponent systems. Constitutive equations for momentum, heat and mass transfer, applications to binary and ternary systems. Details of diffusion with reaction, and the effects of concentration.—I. (I.)

254. Colloid and Surface Phenomena (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in science or engineering or consent of instructor. Thermodynamics and rate processes at interfaces. These fundamental processes will be applied to determine the collective properties of thin films and membranes, self-assembled systems, liquid crystals and colloidal systems. Experimental techniques in surface analysis.—III. (III.) Stroeve, Longo

256. Chemical Kinetics and Reaction Engineering (4)
Lecture—4 hours. Prerequisite: courses 146 or the equivalent. Analysis of the performance of chemical reactors and design of chemical reactors based on the principles of chemical kinetics and transport phenomena. Consideration of noncatalytic/catalytic reactions in single fluid phases and emphasis on reactions in multiphase mixtures, especially gas-solid reactors.—II. (II.)

259. Advanced Engineering Mathematics (4)
Lecture—4 hours. Prerequisite: Mathematics 21D, 22A, 22B. Applications of methods of applied mathematics to the analytical and numerical solution of linear and nonlinear ordinary and partial differential equations arising in the study of transport phenomena.—I. (I.)

262. Transport Phenomena in Multiphase Systems (3)
Lecture/discussion—3 hours. Prerequisite: course 253C. Heat, mass and momentum transfer in multiphase, multicomponent systems with special emphasis on transport processes in porous media. Derivation of the averaging theorem and application of the method of volume averaging to multicomponent, reacting systems.—III. (III.)

263. Rheology and Mechanics of Non-Newtonian Fluids (3)
Lecture—3 hours. Prerequisite: courses 253A and 259 or consent of instructor. Mechanics of polymer solutions and suspension, especially the development of properly invariant constitutive equations. Topics include: viscometry, linear and nonlinear viscoelasticity, continuum mechanics, kinetic theory. Offered in alternate years.—II. Powell

265. Emulsions, Microemulsions and Bilayers (3)
Lecture—3 hours. Prerequisite: an undergraduate course in physical chemistry. Thermodynamic and mechanical descriptions of surfactant-laden interfaces. Forces between and within interfaces. Physics of micelle and microemulsion formation. Structure and stability of emulsions. Properties of phospholipid bilayers, with emphasis on vesicles.—II. (II.) Dungan

267. Advanced Process Control (3)
Lecture—3 hours. Prerequisite: course 157 or the equivalent. Advanced course in analysis and synthesis of linear multivariable systems. Emphasis on frequency domain techniques and applications to

chemical processes. Topics include singular value analysis, internal model control, robust controller design methods as well as self-tuning control techniques. Offered in alternate years.—III.

289A-L. Special Topics in Chemical Engineering (1-5)
Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in (A) Fluid Mechanics; (B) Nonlinear Analysis and Numerical Methods; (C) Process Control; (D) Chemistry of Catalytic Processes; (E) Biotechnology; (F) Interfacial Engineering; (G) Molecular Thermodynamics; (H) Membrane Separations; (I) Advanced Materials Processing; (J) Novel Experimental Methods; (K) Advanced Transport Phenomena; (L) Biomolecular Engineering. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

290. Seminar (1)
Seminar—1 hour. (S/U grading only.)

290C. Graduate Research Group Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress and techniques in chemical engineering. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

294. Current Progress in Biotechnology (1)
Seminar—1 hour. Prerequisite: graduate standing. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (Same course as Molecular and Cellular Biology 294.) (S/U grading only.)—I, II, III. (I, II. III.) Ryu, Doi

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Course

390. Teaching of Chemical Engineering (1)
Discussion—1 hour. Prerequisite: qualifications and acceptance as teaching assistant and/or associate-in in chemical engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated two times for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Courses in Materials Science and Engineering (EMS)

Upper Division Courses

147. Principles of Polymer Materials Science (3)
Lecture—3 hours. Prerequisite: chemistry through organic or Engineering 45; introductory physics sequence. Basic principles of polymer science presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (Same course as Fiber and Polymer Science 100.)—II. (II.)

160. Thermodynamics of Materials Processes and Phase Stability (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45. Review of thermodynamic principles of interest to materials scientists and engineers. Application of thermodynamics to material processing, phase stability, corrosion and oxidation reactions, and environmental issues. Specific examples from molten metallurgy, glass melting, and solid state materials will be used. Only 1 unit of credit allowed to students who have completed course 130. Only 3 units of credit allowed to students who have completed course 144. Not open for credit to students who have completed both courses 130 and 144.—I.

162. Structure and Characterization of Engineering Materials (4)
Lecture—4 hours. Prerequisite: Engineering 45. Description of the structure of engineering materials on the atomic scale by exploring the fundamentals of crystallography. The importance of this structure to materials' properties. Description of experimental determination using x-ray diffraction techniques. Only 2 units of credit allowed to students who have completed course 132. Only 3 units of credit allowed to students who have completed course 142. Only 1 unit of credit allowed to students who have completed both courses 132 and 142.—II.

162L. Structure and Characterization of Materials Laboratory (2)
Laboratory—3 hours; discussion—1 hour. Prerequisite: course 162 (concurrent enrollment recommended). Experimental investigations of structure of solid materials are combined with techniques for characterization of materials. Laboratory exercises emphasize methods used to study structure of solids at the atomic and microstructural levels. Methods focus on optical, x-ray and electron techniques. Only 2 units of credit allowed to students who have completed course 134L. Not open for credit to students who have completed course 132L. GE credit: Wrt.—II.

164. Rate Processes in Materials Science (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45 and course 160. Basic kinetic laws and the principles governing phase transformations. Applications in diffusion, oxidation, nucleation, growth, and spinodal transformations. Only 1 unit of credit allowed to students who have completed course 134. Only 3 units of credit allowed to students who have completed course 144. Not open for credit to students who have completed both courses 134 and 144.—III.

172. Electronic, Optical and Magnetic Properties of Materials (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45, upper division standing in engineering, physics, chemistry, or geology. Electronic, optical, and magnetic properties of materials as related to structure and processing of solid state materials. Physical principles for understanding the properties of metals, semiconductors, ceramics, and amorphous solids and the applications of these materials in engineering.—I.

172L. Electronic, Optical and Magnetic Properties Laboratory (2)
Laboratory—3 hours; lecture/laboratory—1 hour. Prerequisite: course 172 (concurrent enrollment recommended). Experimental investigation of electronic, optical and magnetic properties of engineering materials, emphasizing the fundamental relationship between microstructure and properties as well as the influence of rate processes on the evolution of the microstructure and properties. GE credit: Wrt.—I.

174. Mechanical Behavior of Materials (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45 and course 162. The microscopic and macroscopic aspects of the mechanical behavior of engineering materials, with emphasis on recent development in materials characterization by nondestructive testing. The fundamental aspects of plasticity in engineering materials, strengthening mechanisms and mechanical failure modes of materials systems. Only 1 unit of credit allowed to students who have completed course 138. Only 3 units of credit allowed to students who have completed course 142. Not open for credit to students who have completed both courses 138 and 142. GE credit: Wrt.—I.

174L. Mechanical Behavior Laboratory (2)
Laboratory—3 hours; lecture/laboratory—1 hour. Prerequisite: course 174 (concurrent enrollment recommended). Experimental investigation of mechanical behavior of engineering materials. Laboratory exercises emphasize the fundamental relationship between microstructure and mechanical properties, and the evolution of the microstructure as a consequence of rate process. Not open for credit to students who have completed course 138L. GE credit: Wrt.—I.

180. Materials in Engineering Design (4)
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Engineering 45 and upper division standing in Engineering. Quantitative treatment of materials selection for engineering applications. Discussion of the relationship between design parameters and materials properties. Emphasis on the influence of processing and fabrication on the properties of metals, ceramics, polymers and composites as related to the overall design process. Not open for credit to students who have completed course 140. (Former course 140.) GE credit: Wrt.—III.

181. Materials Processing (4)
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Engineering 45; upper division standing in engineering, physics, chemistry, or geology. Principles of phase equilibria, thermodynamics and reaction kinetics applied to materials processing. Effects of processing variables on the structure-property relationship. Fundamentals of the manufacturing processes for electronic, optical, functional and structural materials. GE credit: Wrt.—II. (II.)

182. Failure Analysis (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 45, upper division standing in science or engineering. Analysis of the way materials fail. Effects of temperature, mechanical deformation and corrosion on the properties of materials. Forensics and methodologies for investigating failures of materials including optical microscopy, x-ray analysis and scanning electron microscopy. Investigation of practical problems. Only 1 unit of credit to students who have completed course 148. Only 3 units of credit to students who have completed course 142 or course 144. Not open for credit to students who have completed both courses 142 and 148 or both courses 144 and 148. GE credit: Wrt.—II.

188A-188B. Materials Design Project (2-2)
Laboratory—3 hours; discussion—1 hour. Prerequisite: course 160, 162, 164, 172, 174. A capstone materials design experience involving analysis of real materials processing and applications including economic, manufacturing, and ethical constraints. Various principles of materials science introduced in other courses in the curriculum are integrated into a team design project. Only 1 unit of credit to students who have completed course 149. (Deferred grading only, pending completion of sequence.)—II-III.

190C. Research Group Conferences (1)
Discussion—1 hour. Prerequisite: consent of instructor; upper division standing. Individual and/or group conference on problems, progress and techniques in materials research. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Lecture—1-5 hours. Prerequisite: consent of instructor. Group study of selected topics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

230. Fundamentals of Electron Microscopy (3)
Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: course 162. Principles and techniques of scanning and transmission of electron microscopy used in the study of materials will be described. Emphasis upon practical applications. Offered in alternate years.—(II.) Browning

230L. Laboratory for Electron Microscopy (2)
Laboratory—6 hours. Prerequisite: course 230 concurrently. Practical application of techniques of electron scanning and transmission microscopy including x-ray microanalysis. Offered in alternate years.—(II.) Browning

232. Advanced Topics in Transmission Electron Microscopy (3)
Lecture—1 hour; discussion—2 hours. Prerequisite: course 230. Advanced course in the techniques of electron microscopy including analytical techniques, probe diffraction methods, and high resolution imaging. Offered in alternate years.—II. Browning

232L. Laboratory for Advanced Transmission Electron Microscopy (2)
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 230L. Laboratory in advanced transmission electron microscopy techniques relevant to specific graduate research projects in materials science. Offered in alternate years.—II.

241. Principles and Applications of Dislocation Mechanics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering; consent of instructor. Concepts in dislocation theory are applied to explain plasticity of crystalline solids. Glide and climb of dislocations, strain hardening, recrystallization, theories of creep processes and interaction of dislocation with solute atoms, precipitates and impurity clouds are discussed. Offered in alternate years.—(II.) Mukherjee

243. Kinetics of Phase Transformation in Engineering Materials (3)
Lecture—3 hours. Prerequisite: graduate standing in Engineering and consent of instructor; course 160 recommended. Theory of alloying, kinetics of phase changes, homogenous and heterogeneous transformation, transformation by shear, order-disorder reactions. Offered in alternate years.—(III.) Groza

244. Interaction of Materials and their Environment (3)
Lecture—3 hours. Prerequisite: Engineering 45 and 105A, or consent of instructor. Thermodynamic and kinetic foundations of the corrosion and oxidation processes. Practical aspects of corrosion control and prevention. Stress-corrosion and gas-embrittlement phenomena. Special topics in corrosion; microbiological and atmospheric corrosion. Offered in alternate years.—I. Munir

248. Fracture of Engineering Materials (3)
Lecture—3 hours. Prerequisite: course 174. Description of the failure of materials by crack propagation. Topics include the stress fields about elastic cracks, the Griffith-Irwin analysis, descriptions of plastic zones, fracture toughness testing, microstructural aspects of fracture and failure at elevated temperatures. Offered in alternate years.—(I.) Gibeling

249. Mechanisms of Fatigue (3)
Lecture—3 hours. Prerequisite: course 174 or consent of instructor; course 248 recommended. Microstructural description of the mechanisms of fatigue in metals. Topics include a phenomenological treatment of cyclic deformation, dislocation processes in cyclic deformation, fatigue crack nucleation, Stage I crack growth, threshold effects and high temperature cyclic deformation. Offered in alternate years.—(I.) Gibeling

250A-F. Special Topics in Polymer and Fiber Science (3)
Lecture—3 hours. Prerequisite: course 147 or consent of instructor. Selected topics of current interest in polymer and fiber sciences. Topics will vary each time the course is offered. (Same course as Textiles and Clothing 250A-F.)—II. (II.)

251. Applications of Solid State Nuclear Magnetic Resonance Spectroscopy (3)
Lecture—3 hours. Prerequisite: graduate standing in chemistry, physics or engineering, or consent of instructor. Fundamentals of solid state NMR spectroscopy and principles of advanced NMR techniques for analyzing structure of solid materials.—III. (III.) Sen

262. Advanced Topics in Structure of Materials (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 162; course 174 recommended; graduate standing in Engineering or consent of instructor. Nature of microstructure in engineering materials. Crystalline and non-crystalline structures, with special emphasis on grain boundary segregation in the development of polycrystalline microstructure and the radial distribution function of amorphous materials. Not open for credit to students who previously completed (cancelled) course 245. Offered in alternate years.—(I.) Browning

282. Glass: Science and Technology (3)
Lecture—2 hours; extensive writing—1 hour. Prerequisite: graduate standing in Chemistry, Physics or Engineering, or consent of instructor. Modern paradigms in glass science and their applications to technologies. Relation of macroscopic properties of glasses and glass-forming liquids to atomic-level structures, including principles of formation, relaxation, transport phenomena, nucleation, crystallization and phase separation in glasses. Offered in alternate years.—III. Sen

289A-G. Special Topics in Materials Science (1-5)
Lecture and/or laboratory. Prerequisite: consent of instructor. Special topics in: (A) Electronic Materials; (B) Ceramics and Minerals; (C) Physics and Chemistry of Materials; (D) Materials Processing; (E) Materials Science and Forensics; (F) Biomaterials; (G) Surface Chemistry of Metal Oxides. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

290C. Graduate Research Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in materials science and engineering research. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

294. Materials Science Seminar (1)
Seminar—1 hour. Current literature and developments in materials science with presentations by individual students. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Shackelford, Mukherjee, Munir, Howitt, Gibeling, Groza, Risbud

298. Group Study (1-5)

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Course

390. The Teaching of Materials Science (1)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in materials science and engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated two times for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Engineering: Civil and Environmental

(College of Engineering)

Sashi K. Kunnath, Ph.D., Chairperson of the Department (530) 752-0586

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James R. Hutchinson, Ph.D., Professor Emeritus
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Bruce E. Larock, Ph.D., Professor Emeritus
Miguel A. Mariño, Ph.D., Professor Emeritus *(Civil and Environmental Engineering; Land, Air and Water Resources)*
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Edward D. Schroeder, Ph.D., Professor Emeritus, Academic Senate Distinguished Teaching Award
Verne H. Scott, Ph.D., Professor Emeritus
Chih-Kang Shen, Ph.D., Professor Emeritus
Michael A. Taylor, Ph.D., Professor Emeritus
George Tchobanoglous, Ph.D., Professor Emeritus

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Brian Maroney, D.Engr., Adjunct Assistant Professor
David Schoellhamer, Ph.D., Adjunct Professor

The Civil and Environmental Engineering Programs

Mission. The Department of Civil and Environmental Engineering integrates research, education, and professional service in areas related to civil infrastructure and the environment. We provide the profession and academia with outstanding graduates who advance both engineering practice and fundamental knowledge.

Program Educational Objectives. Fundamentals: To educate students in the fundamental principles needed for civil and environmental engineering: mathematics, basic sciences, and engineering sciences. Application: To educate students in the application of fundamental principles for solving civil and environmental engineering problems; provide proficiency in at least four of the environmental, geotechnical, structural, transportation, and water resource areas; and expose students to current research. Professionalism: To imbue students with attributes that lead to professional growth throughout their careers:

a sense of community and ethical responsibility; an awareness of business practices; a recognition of the need for life-long learning, continuing education, and participation in professional societies; a preparedness for graduate education; an appreciation for diversity in the engineering profession; the ability to think independently and perform effectively in multidisciplinary teams; and the ability to communicate effectively. Service to State and Profession: To provide an educational program that serves the needs of the state and profession; recruit and retain a diverse student population that is representative of the state; engage in outreach activities; provide an efficient program that minimizes the time-to-degree and maximizes enrollment opportunities; and prepare students for entry into post-graduate education or practice.

Study Abroad and Civil Engineering. The department recently began offering courses in France, Ireland and Italy through the Summer Abroad program. Core and elective courses taken through Summer Abroad can be applied for credit toward the Civil Engineering major. It is also possible for students to complete a portion of the civil engineering program at an international institution, such as the University of Edinburgh, by participating in an Education Abroad Program. The department encourages interested students to participate in both Summer Abroad and Education Abroad Programs. Please consult with the undergraduate staff adviser in Civil Engineering for more information. Often students are in their junior or senior year of study when they participate in this option.

Civil Engineering Undergraduate Program

The Civil Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C and choice of Physics 9D, Chemistry 2C, Biological Science 2A or Geology 50-50L*	19
Chemistry 2A-2B or 2AH-2BH	10
Civil and Environmental Engineering 3 (Civil and Environmental Engineering 3 is designed for freshman students and is not open to upper division students. Students who do not take this course will substitute four units of additional engineering coursework. Non-engineering units from the approved Technical Elective list** may be substituted if within the four unit maximum.)	4
One course from Civil and Environmental Engineering 19, Engineering 6, or Computer Science Engineering 30	4
Engineering 17, 35, 45	11
Civil and Environmental Engineering 16, 17	4
English 3 or University Writing Program 1, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
Communication 1 or 3	4
General Education electives	16
Minimum Lower Division Units	**98**

*Units in excess of the requirement from Chemistry, Biological Sciences, Physics, or Geology courses may count toward the technical elective requirement. Please consult with the departmental staff adviser.

**Departmental technical elective listing available from staff advisor. Maximum of four units from this list may count toward degree requirements.

Upper Division Requirements:

Areas of Specialization

Undergraduates may emphasize one or more of the following areas of specialization, or generalize across all areas. You are urged to consult a departmental adviser when developing your individual program. Additional information on areas of specialization and potential faculty advisers can be obtained from the College of Engineering *Bulletin* and the departmental website.

Environmental Engineering. The focus of this area is on the management and improvement of air, land, and water quality in the face of increasing population and expanding industrialization. Examples of environmental engineering problems include innovative analysis and design of air, water, wastewater, and solid waste treatment systems; mathematical modeling of natural and engineered systems; sampling, analysis, and transport and transformation of natural and anthropogenic pollutants; and modeling of air pollutant emissions.

Suggested technical electives:

Applied Science Engineering 116; Atmospheric Science 121A, 158, 160; Chemical Engineering 143, 146, 161A, 161B, 170; Chemistry 107A, 107B, 128A, 128B; Civil and Environmental Engineering 140, 142, 143, 144, 145, 146, 148A, 148B, 149, 150, 153, 163; Engineering 180; Environmental Science and Policy 150A, 151; Mathematics 128A, 128B, 128C; Mechanical Engineering 161, 163, Microbiology 102, 105, 120, 140, 150; Soil Science 111, 112; Statistics 130A, 130B

Suggested Advisers: C. Cappa, J. L. Darby, T. R. Ginn, A. Kendall, M. J. Kleeman, F.J. Loge, J. R. Lund, M. Modera, D. Niemeier, S. G. Schladow, S. Wuertz, T. M. Young

Geotechnical Engineering. This area deals with civil infrastructure and environmental problems that require quantifying the behavior of geologic materials (e.g., soils and rocks). Examples of geotechnical engineering problems include foundations for buildings and bridges, earthwork (e.g., dams, tunnels, highways), earthquake hazards (e.g., ground motions, liquefaction, soil-structure interaction), and geo-environmental problems (ground water flow, subsurface contaminant transport and remediation).

Suggested technical electives:

Civil and Environmental Engineering 131, 132, 135, 137, 138, 139, 140, 144, 171, 171L, 173, 175, 179; Engineering 180; Geology 17, 50, 50L, 134, 161; Hydrologic Science 146; Mathematics 128A, 128B, 128C

Suggested Advisers: R. W. Boulanger, Y. F. Dafalias, J.T. DeJong, J. T. Harvey, B. Jeremic, B. L. Kutter

Structural Engineering and Structural Mechanics. The focus of this area is the conception, design, analysis, construction, and life-cycle modeling of all types of civil infrastructure, including buildings, bridges, dams, ports, highways, and industrial facilities. Structural materials include metals, reinforced concrete, timber, and advanced composites. Loads range from earthquakes to adverse environmental conditions. Structural mechanics emphasizes theoretical and computational tools that may be used in structural engineering.

Suggested technical electives:

Civil and Environmental Engineering 130, 131, 132, 135, 136, 137, 138, 139, 171, 171L, 173, 175, 179; Engineering 122, 180; Materials Science and Engineering 174; Mathematics 128A, 128B, 128C

Suggested Advisers: J. E. Bolander, Y. K. Chai, L. Cheng, Y. F. Dafalias, J.T. Harvey, A. Kanvinde, S. Kunnath, B. Maroney, M. M. Rashid, N. Sukumar

Transportation Planning and Engineering. This area deals with the movement of people and goods in a manner consistent with society's environmental (e.g. air and water quality) and socio-economic goals (e.g. equity and mobility). Transportation engineering applies engineering, economic, and behavioral science principles to the planning, analysis, design, and operation of transportation systems such as highways and public transit. Transportation planning involves the formulation and analysis of transportation policy, program, and project alternatives in consideration of societal goals, budgetary constraints, economic objectives, and technological feasibilities.

Suggested technical electives:

Civil and Environmental Engineering 137, 149, 153, 161, 162, 163, 165; Engineering 160; Environmental Science and Policy 167, 168A, 168B, 171, 173, 178, 179

Suggested Advisers: Y. Fan, J. T. Harvey, A. Kendall, M. Modera, P. L. Mokhtarian, D. Niemeier, D. Sperling, H. M. Zhang

Water Resources Engineering. This area includes hydrology, hydraulics, fluid mechanics, and water resources systems planning and design. Hydrology deals with quantifying and understanding all aspects of the hydrologic cycle, including the relationships between precipitation, runoff, groundwater, and surface water. Water quality and contaminant transport issues are linked to hydrologic conditions. Hydraulics and fluid mechanics deal with flows in pipes, open-channel water-distribution systems, and natural systems, such as lakes and estuaries. Water resources systems planning and design deals with the comprehensive development of water resources to meet the multiple needs of industry, agriculture, municipalities, recreation, and other activities.

Suggested technical electives:

Agricultural and Resource Economics 176; Atmospheric Science 121A; Biological and Agricultural Engineering 145; Civil and Environmental Engineering 141, 141L, 142, 144, 145, 148B, 153, 155; Environmental Science and Policy 150A, 151; Hydrologic Science 110

Suggested Advisers: F. Bombardelli, T. R. Ginn, M. L. Kavvas, J. R. Lund, S. G. Schladow, B. A. Younis

Civil Engineering

Upper Division Required Courses

Engineering 102, 103, 104, 104L, 105, 106	20
Applied Science Engineering 115	4
Civil and Environmental Engineering 114	4
One course from Applied Science Engineering 116, Civil and Environmental Engineering 153, Mathematics 118A, or Statistics 108	4
A minimum of four of the following group options (a minimum of two courses in each of the four areas and a minimum of 19 design units from group option selections, technical electives, and programming elective. Courses listed in more than one group may be counted only once. The design unit content of each course is noted on the Civil Engineering degree requirement advising sheet, available from the department, also shown in its entirety on the department's undergraduate website.)	28*
Environment: Civil and Environmental Engineering148A or 149 and at least one from courses 140, 143, 148B, 150; *Geotechnical:* Civil and Environmental Engineering 171 and 171 Lab and at least one from courses 173, 175, 179; *Structures:* Civil and Environmental Engineering 135 and at least one from	

courses 130, 131, 132, 136, 137, 138, 139, 179;
Transportation: Civil and Environmental Engineering 161 or 163 and at least one from courses 162, 165, 179;
Water Resources: Civil and Environmental Engineering 141 and 141 Lab and at least one from courses 142, 144, 145, 146, 155

Technical electives 18
Fourteen units to be selected from upper division engineering courses not already used to fulfill another requirement; of these, seven units must be selected from letter-graded Civil and Environmental Engineering courses. Non-engineering units from the Technical Elective list** may be included, not to exceed four units total toward the degree.

General Education electives.....8

Minimum Upper Division Units 86

Minimum Units Required for Major..... 184

*Units in excess of the 28 unit requirement may count toward the technical elective requirement. Please consult with the departmental staff adviser.
**Departmental technical elective listing available from staff advisor. Maximum of four units from this list may count toward degree requirements.

The Minor in Construction Engineering and Management

To pre-apply to this minor program offered by Civil and Environmental Engineering, find full details regarding admission and completion in the Application Form available from the department website or the undergraduate advisor in 2045 Engineering III.

Minor Requirements:

Prerequisite courses must be completed prior to enrollment in coursework taken for minor.

UNITS

Construction Engineering and Management..... 24

Civil and Environmental Engineering 137, 143, 153.....12
Twelve units from Civil and Environmental Engineering 179, Agricultural and Resource Economics 112, 155, 157, 171A, 171B, Economics 134, 162; may include one course from Agricultural and Resource Economics 18, Management 11A, 11B.....12

Minor advisors. J. Darby, J.T. Harvey, J. Lund

The Graduate Program in Civil and Environmental Engineering

M.S. and Ph.D.
Professional Certificate
Designated Ph.D. emphasis available in Biotechnology
http://cee.engr.ucdavis.edu
(530) 752-1441

With over 30 faculty, over $20 million in annual research expenditures and over 220 graduate students, the department of Civil and Environmental Engineering integrates research, education and professional service in areas related to civil infrastructure and the environment. Graduate students benefit from close working relationships with professors who are the leading international experts in their field. They are supported in their study and research by robust funding, and they have access to state-of-the-art research centers. For example, one of the experimental laboratories that constitutes NEES, the Network for Earthquake Engineering Simulation, *nees@ucdavis.edu*, has the largest centrifuge of its kind in the nation and gives researchers access to their peers at other unique centers via high-speed networks. Since 1960, researchers at the J. Amorocho Hydraulics Laboratory (JAHL) have served the state of California by solving ecological, biological, environmental and hydraulic engineering problems. Students may also have the opportunity to work in one of the many modern environmental engineering labs or the structural testing facilities in the department. Our graduates go on to serve the profession and academia by advancing the leading edge of fundamental knowledge, as well as engineering practice.

Generous financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid. About 75% of the graduate students in our program are either fully or partially supported.

Research Highlights:

- Alternative Fuel Transportation Infrastructure
- Earthquake Engineering
- Environmental Engineering
- Environmental Planning and Management
- Geotechnical Engineering
- Hydraulics and Fluid Mechanics
- Hydrology
- Structural Engineering
- Structural Health Monitoring
- Structural Mechanics
- Systems Planning and Design
- Transportation Engineering
- Transportation Planning and Design
- Water Resources Engineering

Research Facilities and Partnerships:

- Center for Environmental and Water Resources Engineering
- Institute of Transportation Studies
- J. Amorocho Hydraulics Laboratory (JAHL)
- Nano-Engineering and Smart Structures Technologies
- NSF NEES Geotechnical Centrifuge
- Tahoe Environmental Research Center

Complete Information on our website.

Courses in Engineering: Civil and Environmental (ECI)

Lower Division Courses

3. Introduction to Civil and Environmental Engineering Systems (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: trigonometry; restricted to lower division students. pass 1 restricted to Civil Engineering majors. An introduction to civil engineering systems. A general view of the engineering process as obtained by participation in laboratory experiments illustrative of the solution of representative, but simplified, engineering problems. Not open for credit to upper division students.—I. (I.) Darby

16. Spatial Data Analysis (2)
Lecture—1 hour; laboratory—3 hours. Restricted to Civil Engineering and Biological Systems Engineering majors; non-majors accommodated on a space-available basis. Computer-aided design and geographic information systems in civil engineering practice.—III. (III.) Fan

17. Surveying (2)
Lecture—2 hours. Prerequisite: Physics 9A (may be taken concurrently). Restricted to Civil Engineering and Biological Systems Engineering majors. Non-majors accommodated on a space-available basis. Theory behind and description of modern methods of land surveying in Civil Engineering.—III. (III.)

19. C Programming for Civil and Environmental Engineers (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 21A (may be taken concurrently). Pass 1 open to Civil Engineering majors and Optical Science and Engineering majors. Computational problem solving techniques for Civil and Environmental Engineering applications using structured C programming. Algorithm design applied to realistic problems.—II. (II.) Jeremic, Kleeman

90X. Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting. May be repeated for credit.

92. Internship in Engineering (1-5)
Internship. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

Upper Division Courses

114. Probabilistic Systems Analysis for Civil Engineers (4)
Lecture—4 hours. Prerequisite: Mathematics 21C. Probabilistic concepts and models in engineering. Statistical analysis of engineering experimental and field data. Introduction to stochastic processes and models of engineering systems. Not open for credit to students who have completed Statistics 120.—I, II. (I, II.) Mokhtarian

119. Parallel Processing for Engineering Applications (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: C programming or consent of instructor. Fundamental skills in parallel computing for engineering applications; emphasis on structured parallel programming for distributed memory parallel clusters. Not open for credit to students who have completed course 119B. Offered in alternate years.—(III.) Kleeman, Jeremic

123. Urban Systems and Sustainability (4)
Lecture—4 hours. Prerequisite: upper division standing. Systems-level approach of how to evaluate and then modify sustainability of urban systems based on interaction with natural environments. Topics include: definition/metrics of urban sustainability; system analyses of urban systems; enabling technology, policies, legislation; measures and modification of ecological footprints. GE Credit: SciEng or SocSci, Div, Wrt.—II. (II.) Kendall

130. Structural Analysis (4)
Lecture—4 hours. Prerequisite: Mathematics 22A, Engineering 104. Elastic structural analysis of determinate and indeterminate trusses, beams and frames. Plastic bending and limit analysis.—III. (III.)

131. Matrix Structural Analysis (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 6 and 104; restricted to Engineering majors only. Matrix formulation and computer analysis of statically indeterminate structures. Stiffness and flexibility formulations for elastic structures. Finite element methods for elasticity and bending problems.

132. Structural Design: Metallic Elements (4)
Lecture—4 hours. Prerequisite: Engineering 104. Design of metallic beams, columns, and other members for various types of loading and boundary conditions; design of connections between members; member performance within structural systems.—II. (II.) Kanvinde

135. Structural Design: Concrete Elements (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 104; restricted to majors in Civil Engineering, Civil Engineering/Materials Science and Engineering, or Materials Science and Engineering only. Strength design procedures for columns, rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond. Introduction to prestressed concrete.—I, III. (I, III.) Chai

136. Building Design: Wood, Steel, and Concrete Applications (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 130 or 131, course 135; course 132 recommended. Horizontal and lateral load paths; dead and live loading; earthquake and wind forces. Approximate analyses of building frames; wood engineering for buildings. Steel, concrete and wood building design.

137. Construction Principles (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division standing in Engineering; Engineering 104 recommended. Project management, with civil engineering construction and design applications, including project scope, schedule, resources, cost, quality, risk, and control. Construction industry overview. Interactions between planning, design, construction, operations. Construction operations analysis. Contract issues. Project management software, field trips, guest lectures.—III. (III.) Harvey

138. Earthquake Loads on Structures (4)
Lecture—4 hours. Prerequisite: Engineering 102, course 130 or 131. Determination of loads on structures due to earthquakes. Methods of estimating equivalent static lateral forces; response spectrum and time history analysis. Concepts of mass, damping and stiffness for typical structures. Design for inelastic behavior. Numerical solutions and Code requirements.—II. (II.)

139. Advanced Structural Mechanics (3)
Lecture—3 hours. Prerequisite: Engineering 104 or the equivalent. Review of stress, strain, equilibrium, compatibility, and elastic material behavior. Plane stress and plane strain problems in elasticity theory; stress function. Theories for straight, tapered, composite, and curved beams. Beams on elastic foundations. Introduction to plates, curved membranes, and cables.—(III.) Dafalias

140. Environmental Analysis of Aqueous Systems (3)
Lecture—3 hours. Prerequisite: Chemistry 2B; course 148A recommended. Introduction to chemical principles underlying current practices in sampling and analysis of water and wastewater.—I. (I.) Young

140L. Environmental Analysis of Aqueous Systems Laboratory (1)
Laboratory—3 hours. Prerequisite: Chemistry 2B or the equivalent; course 140 (may be taken concurrently). Restricted to Civil Engineering undergraduate and graduate students. Introduction to "wet chemical" and instrumental techniques commonly used in the examination of water and wastewater and associated data analysis.

141. Engineering Hydraulics (3)
Lecture—3 hours. Prerequisite: Engineering 103. Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects: boundary layers, lift and drag.—I, III. (I, III.) Schladow

141L. Engineering Hydraulics Laboratory (1)
Laboratory—3 hours. Prerequisite: course 141 (may be taken concurrently). Open to Engineering students only. Laboratory experiments and demonstrations on flow measurement, sluice gates, hydraulic jump, flow characteristics, and centrifugal pumps.—I, III. (I, III.) Schladow

142. Engineering Hydrology (4)
Lecture—4 hours. Prerequisite: course 141 (may be taken concurrently); course 114 recommended. Restricted to students in the College of Engineering. The hydrologic cycle. Evapotranspiration, interception, depression storage and infiltration. Streamflow analysis and modeling. Flood routing through channels and reservoirs. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Hydrologic design.—I. (I.) Kavvas

143. Green Engineering Design and Sustainability (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Restricted to Civil Engineering and Civil Engineering/Materials Science and Engineering majors only. Application of concepts, goals, and metrics of sustainability, green engineering, and industrial ecology to the design of engineered systems. Life-cycle analyses, waste audit and environmental management systems, economics of pollution prevention and sustainability, and substitute materials for products and processes.—I. (I.) Loge

144. Groundwater Systems Design (4)
Lecture—4 hours. Prerequisite: course 141. Groundwater occurrence, distribution, and movement; groundwater flow systems; radial flow to wells and aquifer testing; aquifer management; groundwater contamination; solute transport by groundwater; fate and transport of subsurface contaminants. Groundwater supply and transport modeling.—I. (I.) Ginn

144L. Groundwater Systems Design Laboratory (1)
Laboratory—3 hours. Prerequisite: course 144, taken concurrently. Computer modeling of groundwater flow under regional gradient, well injection/withdrawal, and natural and engineered boundary conditions. Use of Groundwater Vistas computer program.—I. (I.) Ginn

145. Hydraulic Structure Design (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 141 and 141L; course 142 recommended. Fundamental principles and practical aspects of the design of hydraulic structures including water storage, conveyance, and pumping systems. Emphasis on use of industry-standard computer software for hydraulic design.—III. (III.) Younis

146. Water Resources Simulation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103; Applied Science Engineering 115, course 141, 142 recommended. Computer simulation techniques in the analysis, design and operation of surface water systems; modeling concepts and practices with application to surface runoff; water quality in rivers and streams and dispersion of contaminants in water bodies. GE credit: Wrt.—II. (II.) Bombardelli

148A. Water Quality Management (4)
Lecture—4 hours. Prerequisite: Chemistry 2B. Basic concepts of water quality. Fundamentals of water and wastewater treatment processes. Analysis of treatment process flowsheets. Analysis of water quality management alternatives.—II. (II.) Wuertz

148B. Water Quality Management Systems Design (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103, course 148A. Application of the principles of fluid mechanics to the analysis and design of flow measuring devices, pumps and pump station design, water distribution systems, wastewater collection systems, water and wastewater treatment plant headloss analysis, and bioremediation systems.—III. (III.) Darby

149. Air Pollution (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21D, 22B, Chemistry 2B, Atmospheric Science 121A or Engineering 103. Physical and technical aspects of air pollution. Emphasis on geophysical processes and air pollution meteorology as well as physical and chemical properties of pollutants. (Same course as Atmospheric Science 149.)—I. (I.) Cappa

150. Air Pollution Control System Design (4)
Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: Engineering 103, 105, 106, course 149. Design and evaluation of air pollution control devices and systems.—II. (II.) Cappa

153. Deterministic Optimization and Design (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 21C, 22A, computer programming course; Applied Science Engineering 115 recommended. Operations research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming. Applications in water, transportation, environmental, infrastructure systems, and other civil engineering disciplines through computer-based course projects.—I. (I.) Fan

155. Water Resources Engineering Planning (4)
Lecture—4 hours. Prerequisite: Engineering 106 or Economics 1A, course 114, 142; course 153 recommended. Basic engineering planning concepts; role of engineering, economic, environmental and social information and analysis; institutional, political and legal aspects. Case studies and computer models illustrate the planning of water resource systems. GE credit: Wrt.—(III.) Lund

161. Transportation System Operations (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 6 (or the equivalent) and 102. Principles of transportation system operations; traffic characteristics and methods of measurement; models of transportation operations and congestion applied to urban streets and freeways.—II. (II.) Zhang

162. Transportation Land Use Sustainable Design (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 161 or 163. Interactions between land use and transportation systems design. Generalized design paradigm; group problem solving.—III. (III.) Niemeier

163. Energy and Environmental Aspects of Transportation (4)
Lecture—3 hours; extensive writing. Prerequisite: Economics 1A and course 162. Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (Same course as Environmental Science and Policy 163.) Offered in alternate years. GE credit: Wrt.—I. Sperling

165. Transportation Policy (3)
Lecture—3 hours. Prerequisite: Economics 1A and Engineering 106 recommended. Transportation and associated environmental problems confronting urban areas, and prospective technological and institutional solutions. Draws upon concepts and methods from economics, engineering, political science and environmental studies. Offered in alternate years. GE credit: SocSci, Wrt.—(I.) Sperling

171. Soil Mechanics (4)
Lecture—4 hours. Prerequisite: Engineering 103 and 104 (may be taken concurrently), course 171L must be taken concurrently. Restricted to Civil Engineering and Civil Engineering/Materials Science and Engineering majors only. Soil formations, mass-volume relationships, soil classification, effective stress, soil-water-void relationships, compaction, seepage, capillarity, compressibility, consolidation, strength, states of stress and failure, lateral earth pressures, and slope stability.—I, III. (I, III.) Kutter

171L. Soil Mechanics Laboratory (1)
Laboratory—3 hours. Prerequisite: course 171 must be taken concurrently. Laboratory studies utilizing standard testing methods to determine physical, mechanical and hydraulic properties of soil and demonstration of basic principles of soil behavior.—I, III. (I, III.) Kutter

173. Foundation Design (4)
Lecture—4 hours. Prerequisite: courses 135 (may be taken concurrently) and 171. Soil exploration and determination of soil properties for design; consolidation and elastic settlements of foundations; bearing capacity of soils and footing design; lateral earth pressures and retaining wall design; pile foundations; excavations and dewatering.—II. (II.) Boulanger

175. Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite: course 171 and 171L. Earthquake sources and ground motions. Cyclic behavior of soils; triggering, consequences, and mitigation of effects of liquefaction. NEES (Network for Earthquake Engineering Simulation) equipment and techniques for studying earthquake engineering with focus on liquefaction problems.—(II.) Kutter

179. Pavement Engineering (4)
Lecture—3 hours; discussion/lecture—3 hours. Prerequisite: Engineering 104. Pavement types (rigid, flexible, unsurfaced, rail), their applications (roads, airfields, ports, rail) and distress mechanisms. Materials, traffic and environment characterization. Empirical and mechanistic-empirical design procedures. Maintenance, rehabilitation and reconstruction; construction quality; asphalt concrete mix design.—I. (I.) Harvey

189A-J. Selected Topics in Civil Engineering (1-5)
Prerequisite: consent of instructor. Directed group study of selected topics with separate sections in (A) Environmental Engineering; (B) Hydraulics and Hydrologic Engineering; (C) Engineering Planning; (D) Geotechnical Engineering; (E) Structural Engineering; (F) Structural Mechanics; (G) Transportation Engineering; (H) Transportation Planning; (I) Water Resources Engineering; (J) Water Resources Planning. May be repeated for credit when the topic is different.—I, II, III. (I, II, III.)

190C. Research Group Conferences in Civil and Environmental Engineering (1)
Discussion—1 hour. Prerequisite: upper division standing in Civil and Environmental Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship in Engineering (1-5)
Internship. Prerequisite: upper division standing; approval of project prior to the period of the internship. Supervised work experience in civil engineering. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: senior standing in engineering and at least a B average. (P/NP grading only.)

Graduate Courses

201. Introduction to Theory of Elasticity (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 104. Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexture and torsion of bars of various shapes. Introduction to variational and approximate methods.—I. (I.) Rashid

203. Inelastic Behavior of Solids (3)
Lecture—3 hours. Prerequisite: course 201. Fundamentals of theories of plasticity, viscoelasticity and viscoplasticity for solids. Macroscopic constitutive modelling for engineering materials, e.g., metals, polymers, soils, etc., and microscopic motivation. Offered in alternate years.—Dafalias

205. Continuum Mechanics (3)
Lecture—3 hours. Prerequisite: course 201. Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Invariance and symmetry requirements. Introduction to nonlinear thermoelasticity and thermodynamics. Solution of three-dimensional problems. Selected topics. Offered in alternate years.—Dafalias

206. Fracture Mechanics (4)
Lecture—4 hours. Prerequisite: course 201; Engineering 104. Linear and nonlinear fracture mechanics, stress analysis, energy concepts, brittle fracture criteria, path independent integrals, Dugdale- Barenblatt model, general cohesive zone models, ductile fracture criteria, crack tip fields for stationary and propagating cracks, fatigue. Application of numerical methods for fracture mechanics.Offered in alternate years.—Rashid

211. Advanced Matrix Structural Analysis (4)
Lecture—4 hours. Prerequisite: course 131. Analysis of complex frameworks by the displacement method; treatment of tapered beams, curved beams, and beams on elastic foundations; partially rigid connections; geometric and material nonlinearities; buckling; flexibility-based formulations; FEM-software for nonlinear analysis of structures.—I. (I.) Kunnath

212A. Finite Element Procedures in Applied Mechanics (4)
Lecture—4 hours. Prerequisite: Applied Science Engineering 115, or Mathematics 128A and Mathematics 128B (may be taken concurrently). Weighted-residual and Rayleigh-Ritz methods. Weak/variational formulation and development of discrete equations using finite element approximations. Application to one- and two-dimensional problems (heat conduction).—II. (II.) Sukumar

212B. Finite Elements: Application to Linear and Non-Linear Structural Mechanics Problems (4)
Lecture—4 hours. Prerequisite: course 212A. Application to linear and nonlinear structural mechanics problems. Linear elasticity, weak form, and finite element approximation. Incompressible media problems. Non-linear problems with material nonlinearity.—(III.) Sukumar

213. Analysis of Structures Subjected to Dynamic Loads (4)
Lecture—4 hours. Prerequisite: courses 138 and 211. Analysis of structures subjected to earthquake, wind and blast loading; distributed, consistent and lumped mass techniques; computer implementation; nonlinear response spectrum; frequency and time domain analysis; seismic protection of structures; numerical methods in linear and nonlinear structural dynamics.—I. (I.) Kunnath

221. Theory of Plates and Introduction to Shells (3)
Lecture—3 hours. Prerequisite: course 201 (may be taken concurrently). Development of classical and refined plate theories. Application to isotropic, orthotropic and composite plates. Solutions for rectangular and circular plates. Membrane theory for axisymmetric shells and bending of circular shells.

232. Advanced Topics in Concrete Structures (4)
Lecture—4 hours. Prerequisite: course 130, 135, 138 and graduate standing. Ductility of reinforced concrete; strength of two-way slabs; modified compression field theory.—I. (I.) Chai

233. Advanced Design of Steel Structures (4)
Lecture—4 hours. Prerequisite: courses 130 or 131, 132. Review of Load and Resistance Factor Design (LRFD); steel-plate girder design; plastic design of indeterminate systems; moment frames and bracing systems; connection design; seismic design of steel structures; vibration of flooring systems; steel-concrete composite design.—III. (III.) Kanvinde

234. Prestressed Concrete (4)
Lecture—4 hours. Prerequisite: courses 130 or 131, 135. Survey of methods and applications; prestressing materials and systems; prestress losses; flexural design; design for shear and torsion; deflection computation and control; continuous beams and indeterminate structures; floor systems; partial prestressing; design of compression members; strut-and-tie models. Offered in alternate years—II. Bolander

235. Cement Composites (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 104. Applications of cement composites; materials selection and proportioning; component and composite properties; hydration reactions and microstructure development; mechanisms of failure; nondestructive test methods; fiber reinforcement; concrete durability; novel reinforcing materials; ferrocement; repair and retrofit technologies; applications to structural design. Offered in alternate years.—(II.) Bolander

236. Design of Fiber Reinforced Polymer Composite Structures (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 135. Basics of mechanics and design of polymer matrix composites: composite classification, manufacturing process, micromechanical property determination, classical lamination theory, strength theories, first-ply-failure, test methods, design practice, strengthening and retrofitting of existing reinforced concrete structures.—I. (I.) Cheng

237. Bridge Design (4)
Lecture—4 hours. Prerequisite: courses 130, 135; course 234 recommended. Open to graduate students only. Bridge types, behavior and construction characteristics; design philosophy, details according to Caltrans and American Association of State Highway and Transportation Officials codes, principles; seismic design and retrofit of concrete bridges; modern bridges using advanced fiber reinforced polymer composites; fieldtrip required.—II. (II.) Cheng

238. Performance-Based Seismic Engineering (4)
Lecture—4 hours. Prerequisite: Courses 138 and 213. Modern seismic design; performance-based seismic design; seismic hazard; seismic demands: linear and nonlinear procedures; performance assessment: deterministic and probabilistic procedure; review of FEMA-350, FEMA-356, ATC-40 and other performance-based guidelines.—. II. (II.) Kunnath

240. Water Quality (4)
Lecture—4 hours. Prerequisite: courses 141 and 142. Quality requirements for beneficial uses of water. Hydrologic cycle of quality. Hydromechanics in relation to quality of surface and groundwaters; transport and fate of waterborne pollutants. Heat budget for surface waters; predictive methods; introduction to water quality modeling.—II. (II.) Schladow

241. Air Quality Modeling (4)
Lecture—4 hours. Prerequisite: Applied Science Engineering 115, course 119A, 149, 150, one from course 242 or 247, or the equivalent, graduate standing. Modeling of urban and regional air quality problems including gas-phase chemical reactions, aqueous-phase chemical reactions, phase partitioning, and numerical solution schemes. Offered in alternate years.—I. Kleeman

242. Air Quality (4)
Lecture—4 hours. Prerequisite: Engineering 105, course 141, 149 or the equivalent. Factors determining air quality. Effects of air pollutants. Physical and chemical fundamentals of atmospheric transport and reaction. Introduction to dispersion modeling. Offered in alternate years.—(III.) Kleeman

243A. Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite: course 148A or the equivalent. Characteristics of water and airborne wastes; treatment processes and process kinetics; treatment system design.—I. (I.) Young

243B. Water and Waste Treatment (4)
Lecture—4 hours. Prerequisite: course 243A. Continuation of course 243A. Aeration, thickening, biological processes, design of biological treatment systems.—II. (II.) Loge

245A. Applied Environmental Chemistry: Inorganic (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 105, Chemistry 2B or the equivalent, course 140; Chemistry 2C or 107A recommended. Chemistry of natural and polluted waters. Topics include chemical, kinetic and equilibrium principles, redox reactions, gas solution and solid-solution equilibria, thermodynamics, carbonate systems, coordination chemistry, interfacial phenomena. Offered in alternate years.—(III.) Young

245B. Applied Environmental Chemistry: Organic (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 128A, 128B, 128C, or the equivalent; Chemistry 2C or 107A recommended. Transport and transformation of organic chemicals in the environment. Topics include application of thermodynamics to predict solubility and activity coefficients; distribution of organic chemicals between the aqueous phase and air, solvent, or solid phases; chemical, photochemical and biological transformation reactions. Offered in alternate years.—III. Young

246. Pilot Plant Laboratory (4)
Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: course 243A, 243B (may be taken concurrently) or consent of instructor, graduate standing. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment.—II. (II.) Darby

247. Aerosols (4)
Lecture—4 hours. Prerequisite: Engineering 103, 105, course 141, 149. Behavior of airborne particles including particle formation, modification, and removal processes. Offered in alternate years.—I. Kleeman

247L. Aerosols Laboratory (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 247. Methods of generation and characterization of aerosols. Detailed topics may include flow rate measurement, aerosol generation, aerosol collection, ions measurement, metals measurement, and carbon measurement. May be repeated one time for credit.—(I.) Kleeman

248. Biofilm Processes (4)
Lecture—4 hours. Prerequisite: Soil Science 111 or 211 or course 243B or consent of instructor; calculus and basic cell molecular biology recommended. Natural and engineered biofilms, including biofilm occurrence and development, spatial structure, microbial processes, fundamental and applied research tools, biofilm reactors, beneficial uses, and detrimental effects.—III. Wuertz

249. Probabilistic Design and Optimization (4)
Lecture—4 hours. Prerequisite: courses 114 and 153 and Engineering 106, or equivalents. Design by optimization for probabilistic systems, decision theory, the value of information, probabilistic linear programming, probabilistic dynamic programming, nonlinear probabilistic optimization. Applications in civil engineering design, project evaluation, and risk management. Offered in alternate years.—II. Lund

250. Civil Infrastructure System Optimization and Identification (4)
Lecture—4 hours. Prerequisite: Mathematics 21C, 22A, programming course; Applied Science Engineering 115 and mathematical modeling course recommended. Applied mathematics with a focus on modeling, identifying, and controlling dynamic, stochastic, and underdetermined systems. Applications in transportation networks, water resource planning, and other civil infrastructure systems. Offered in alternate years.—(III.) Fan

251. Transportation Demand Analysis (4)
Lecture—4 hours. Prerequisite: course 114 or the equivalent. Procedures used in urban travel demand forecasting. Principles and assumptions of model components (trip generation, trip distribution, model split). New methods of estimating travel demand. Computer exercises using empirical data to calibrate models and forecast travel demand.—I. (I.) Niemeier

252. Sustainable Transportation Technology and Policy (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 165. Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (Same course as Environmental Science and Policy 252.) Offered in alternate years—III. Sperling

253. Dynamic Programming and Multistage Decision Processes (4)
Lecture—4 hours. Prerequisite: Mathematics 21C, 22A, programming course; Applied Science Engineering 115 recommended. Operations research. Optimization techniques with a focus on dynamic programming in treating deterministic, stochastic, and adaptive multistage decision processes. Brief review of linear programming and non-linear programming. Applications in transportation networks and other civil infrastructure systems.—III. (III.) Fan

254. Discrete Choice Analysis of Travel Demand (4)
Lecture—4 hours. Prerequisite: course 114. Behavioral and statistical principles underlying the formulation and estimation of discrete choice models. Practical application of discrete choice models to characterization of choice behavior, hypothesis testing, and forecasting. Emphasis on computer exercises using real-world data sets.—III. (III.) Mokhtarian

256. Urban Traffic Management and Control (4)
Lecture—4 hours. Prerequisite: course 114. Basic concepts, models, and methods related to the branch of traffic science that deals with the movement of vehicles on a road network, including travel speed, travel time, congestion concepts, car-following and hydrodynamic traffic models.—I. (I.) Zhang

257. Flow in Transportation Networks (4)
Lecture—4 hours. Prerequisite: course 153; 161 or 256 recommended. Elements of graph theory, a survey of pertinent optimization techniques, extremal principles in network flow problems, deterministic equilibrium assignment, stochastic equilibrium assignment, extensions of equilibrium assignments and dynamic transportation network assignment.—II. (II.) Zhang

258. Transportation Planning in Developing Countries (3)
Lecture—3 hours. Prerequisite: course 160 or consent of instructor. Investigation of the role that transportation investments and policies play in the development of regions and countries. Emphasis is on identifying appropriate technologies, policies, and planning methods for designing transportation systems in regions of differing socioeconomic, geographic, and institutional settings. Offered in alternate years.—(III.) Sperling

259. Asphalt and Asphalt Mixes (4)
Lecture—4 hours. Prerequisite: course 179 or consent of instructor. Asphalts and asphalt mix types and their use in civil engineering structures, with primary emphasis on pavements. Asphalt, aggregate properties and effects on mix properties. Design, construction, recycling. Recent developments and research. Offered in alternate years.—(II.) Harvey

260. Sediment Transport (4)
Lecture—4 hours. Prerequisite: course 141 or equivalent. Sediment transport in hydrologic systems. Process-oriented course which will emphasize how sediment moves and the physical processes that affect sediment transport. Field trip. Offered in alternate years.—Schoellhamer

264A. Transport, Mixing and Water Quality in Rivers and Lakes (4)
Lecture—4 hours. Prerequisite: course 141 and 240. Principal causes of mixing and transport in rivers, lakes and reservoirs, and their impacts on water quality. Case studies of specific lakes and rivers. Offered in alternate years.—Schladow

264B. Transport, Mixing and Water Quality in Estuaries and Wetlands (4)
Lecture—4 hours. Prerequisite: courses 141 and 240. Principal causes of mixing and transport in estuaries and wetlands, and their impacts on water quality. Topics include advection/diffusion; tides; transverse mixing; longitudinal dispersion; sediment transport; nutrient cycling; computer modeling of estuaries. Case studies of specific systems. Offered in alternate years.—Schladow

265. Stochastic Contaminant Transport (4)
Lecture—4 hours. Prerequisite: course 266. Stochastic theory of molecular diffusion covered by means of Taylor-Chandrasekhar theory. Turbulence diffusion covered in the Lagrangian-Eulerian frameworks. Application of theory to contaminant transport in groundwater aquifers, atmosphere, river and oceanic environments. Offered in alternate years.—(I.) Kavvas

266. Applied Stochastic Methods in Engineering (4)
Lecture—4 hours. Prerequisite: course 114 or Mathematics 131 or Statistics 130A or 131A; Mathematics 118A (may be taken concurrently). Stochastic processes classification; Gaussian random fields; stochastic calculus in mean square; Ito and Stratonovich stochastic differential equations; Fokker-Planck equation; stochastic differential equations with random coefficients. Offered in alternate years.—I. Kavvas

267. Water Resources Management (3)
Lecture—3 hours. Prerequisite: courses 114, 141 and 142; course 153 recommended. Engineering, institutional, economic, and social basis for managing local and regional water resources. Examples in the context of California's water development and management. Uses of computer modeling to improve water management.—I. (I.) Lund

268. Infrastructure Economics (3)
Lecture—3 hours. Prerequisite: Economics 1A, Engineering 106 or the equivalent. Economics applied to infrastructure engineering planning, operations, maintenance, and management problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance. Offered in alternate years.—(II.) Lund

269. Transportation-Air Quality: Theory and Practice (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 149 or the equivalent. Health and regulatory aspects of airborne pollutants. Principles of modeling vehicle emissions. Conformity issues and the regulatory framework. Regional and micro-scale modeling. Offered in alternate years.—III. Niemeier

270. Advanced Water Resources Management (3)
Lecture—3 hours. Prerequisite: courses 153 and 267 or the equivalent. Discussion of technical papers related to planning theory, system maintenance, regionalization, multi-objective methods, risk analysis, institutional issues, pricing model application, economic development, forecasting, operations, and other topics. Offered in alternate years.—III. Lund

271. Inverse Problems (4)
Lecture—3 hours. Prerequisite: courses 114 and 144 or equivalents. Inverse calibration of distributed parameter models, using data representing model outputs. Forward and inverse mappings, stability, uniqueness, identifiability. Optimization formulation of inverse problems, maximum likelihood and other objective functions, indirect and direct approaches, solution by UCODE in hands-on project format.—I. (I.) Ginn

272A. Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite: course 144; Mathematics 118A recommended. Flow in confined, unconfined, and leaky aquifers. Geological aspects of aquifers. Regional groundwater flow and hydraulics of pumping and recharging wells. Identification of aquifer parameters. Isotope hydrogeology and recharge estimation.—II. (II.) Ginn

272B. Advanced Hydrogeology (4)
Lecture—4 hours. Prerequisite: courses 212A and 272A. Processes of subsurface flows and transport. Numerical methods of subsurface fluid flow and transport systems. Flow in the unsaturated zone. Fresh water/salt water interface in coastal aquifers. Macrodispersion. Identification of regional aquifer parameters. Modeling of aquifer systems. Offered in alternate years.—(III.) Ginn

272C. Multiphase Reactive Transport (4)
Lecture—4 hours. Prerequisite: courses 142, 144, 148A. Multicomponent reactive transport including multiple phases. Advective/dispersive transport, chemical equilibria, and mass transformation kinetics. Natural chemical/microbiological processes including sorption, complexation, biodegradation, and diffusive mass transfer. Eulerian and Lagrang-

ean averaging methods. Applications to contaminant remediation problems in river and subsurface hydrology. Offered in alternate years.—Ginn

273. Water Resource Systems Engineering (3)
Lecture—3 hours. Prerequisite: courses 114 and 153 or the equivalent. Planning, design, and management of water resource systems. Application of deterministic and stochastic optimization techniques. Water allocation, capacity expansion, and design and operation of reservoir systems. Surface water and groundwater management. Offered in alternate years.—(I.) Lund

275. Hydrologic Time-Series Analysis (4)
Lecture—4 hours. Prerequisite: course 114 and 142. Application of statistical methods for analysis and modeling of hydrologic series. Statistical simulation and prediction of hydrologic sequences using time series methodology. Offered in alternate years.—(III.) Kavvas

276. Watershed Hydrology (4)
Lecture—4 hours. Prerequisite: course 142 or the equivalent. Analysis and mathematical modeling of hydrologic processes taking place in a watershed. Precipitation analysis and modeling. Theory of overland flow and its kinematic wave approximation. Analysis and modeling of saturated and unsaturated subsurface flow processes taking place on a hill slope.—II. (II.) Kavvas

277A. Computational River Mechanics I (4)
Lecture—4 hours. Prerequisite: Applied Science Engineering 115, course 141 (both may be taken concurrently). Unsteady open channel flows, computation of water surface profiles, shallow water equations, St. Venant equations, method of characteristics, finite difference methods, stability and accuracy of explicit and implicit schemes, flood routing in simple and compound channels, advection of plumes. Not open for credit to students who have completed course 277.—I. (I.) Younis

277B. Computational River Mechanics II (4)
Lecture—4 hours. Prerequisite: course 277A. Open channel flows, physical aspects of river mechanics, formulation of depth-averaged equations, boundary conditions, coordinates transformation and grid generation, finite-difference solution techniques, applications to two-dimensional momentum and pollutant transport in rivers. Offered in alternate years.—(III.) Younis

277C. Turbulence and Mixing Processes (4)
Lecture—4 hours. Prerequisite: graduate standing. Nature of turbulent flows, conservation equations, momentum, heat and mass transport in free and wall-bounded flows, body forces and mixing, roughness effects, turbulence modeling and simulation. Offered in alternate years.—(III.) Younis

278. Hydrodynamics (3)
Lecture—3 hours. Prerequisite: course 141. Perturbation methods. Basic water waves. Governing equations for fluid motion on a rotating earth. Rotation effects, vorticity dynamics, Ekman layer. Stratification effects, internal waves and turbulent mixing. Combined effects. Offered in alternate years.—(II.)

279. Advanced Mechanics of Fluids (4)
Lecture—4 hours. Prerequisite: course 141. Rotational flows. Navier-Stokes equations and solutions for laminar flow; boundary layer equations and solution techniques. Nature of turbulence. Reynolds equations. Introduction to turbulence modeling. Offered in alternate years.—I. Bombardelli

280A. Nonlinear Finite Elements for Elastic-Plastic Problems (4)
Lecture—4 hours. Prerequisite: consent of instructor. State of the art finite element methods and tools for elasticplastic problems, including computational techniques based on the finite element method and the theory of elastoplasticity. Offered in alternate years.—(III.) Jeremic

280B. Nonlinear Dynamic Finite Elements (4)
Lecture—4 hours. Prerequisite: consent of instructor. State of the art computational methods and tools for analyzing linear and nonlinear dynamics problems. Offered in alternate years.—Jeremic

281A. Advanced Soil Mechanics (4)
Lecture—4 hours. Prerequisite: course 171. Consolidation and secondary compression. Preloading and wick drains. Seepage and seepage pressures. Filtration, drainage, and dewatering. Shear strength: friction, cohesion, dilatancy and critical states.—I. (I.) Jeremic

281B. Advanced Soil Mechanics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 281A. Site investigation methods: CPT, SPT, pressuremeter, vane, seismic investigation, electrical properties. Slope stability, including seepage pressures and earthquake effects. Slope stabilization and reinforcement methods. Centrifuge modeling.—II. (II.) DeJong

282. Pavement Design and Rehabilitation (4)
Lecture—4 hours. Prerequisite: course 179 or consent of instructor. Advanced pavement design and structural/functional condition evaluation for concrete and asphalt pavements. Highways, airfields, port facilities; new facilities, rehabilitation, reconstruction. Mechanistic-empirical procedures, materials, climate and traffic characterization. Use of current design methods; recent developments and research. Offered in alternate years.—II. Harvey

283. Physico-Chemical Aspects of Soil Behavior (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171. Soil formation, mineralogy, and transport; soil-fluid-electrolyte systems; electrical, surface tension, van der Waals forces; particle shape and contact mechanics, and electromagnetic and mechanical properties of soils. Laboratories demonstrate effects of chemical admixtures, salts and particle texture on soil behavior.—III. (III.) Kutter

284. Theoretical Geomechanics (4)
Lecture—4 hours. Prerequisite: course 171. Elasticity, plasticity, micromechanics, coupled behavior and large deformations for geomaterials. Prediction of stress-strain-volume change behavior of geomaterials. Monotonic and cyclic loading, anisotropy, bifurcation of deformation.—II. (II.) Kutter

286. Advanced Foundation Design (4)
Lecture—4 hours. Prerequisite: course 173. Design and analysis of pile and pier foundations, including seismic effects; deep excavation systems; tie-back, nailing, and anchor systems; coffer dams; loads on buried conduits; ground modification techniques; and other related topics.—I. (I.) DeJong

287. Geotechnical Earthquake Engineering (4)
Lecture—4 hours. Prerequisite: courses 138 and 281A. Characteristics and estimation of earthquake ground motions; wave propagation and local site response; liquefaction potential and remediation; residual strength and stability considerations; ground deformations; dynamic soil-structure interaction.—III.

288. Earth and Rockfill Dams (4)
Lecture—4 hours. Prerequisite: courses 281A and 281B (may be taken concurrently). Site selection; design considerations; layout; seismic effects including considerations of fault movements; construction; environmental considerations, instrumentation; maintenance remediation and retrofit of existing dams. Offered in alternate years.—(II.)

289A-I. Selected Topics in Civil Engineering (1-5)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Directed group study of special topics with separate sections in (A) Environmental Engineering; (B) Hydraulics and Hydrologic Engineering; (C) Engineering Planning; (D) Geotechnical Engineering; (E) Structural Engineering; (F) Structural Mechanics; (G) Transportation Engineering; (H) Transportation Planning; (I) Water Resources Engineering; (J) Water Resources Planning. May be repeated for credit.—I, II, III. (I, II, III.)

290. Seminar (1)
Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study. Course required of graduate degree candidates. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Graduate Research Group Conference (1)
Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

296. Topics in Water and Environmental Engineering (1)
Seminar—2 hours. Seminars presented by visiting lecturers, UC Davis faculty and, graduate students. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Course

390. The Teaching of Civil Engineering (1)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Civil Engineering. Participation as teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for total of 9 units. (S/U grading only.)—I, II, III. (I, II, III.)

Engineering: Computer Science

(College of Engineering)

Prasant Mohapatra, Ph.D., Chairperson of the Department

Department Office. 2063 Kemper Hall
(530) 752-7004; *http://www.cs.ucdavis.edu*

Faculty

Nina Amenta, Ph.D., Professor
Zhaojun Bai, Ph.D., Professor
Matthew Bishop, Ph.D., Professor
Hao Chen, Ph.D., Assistant Professor
Ian Davidson, Ph.D. Assistant Professor
Premkumar T. Devanbu, Ph.D., Professor
Matthew K. Farrens, Ph.D., Professor
Vladimir Filkov, Ph.D, Assistant Professor
Matthew Franklin, Ph.D., Professor
Dipak Ghosal, Ph.D., Professor
Todd J. Green, Ph.D., Assistant Professor
Daniel Gusfield, Ph.D., Professor
Bernd Hamann, Ph.D., Professor
Kenneth I. Joy, Ph.D., Professor,
Academic Senate Distinguished Teaching Award
Patrice Koehl, Ph.D., Associate Professor
Karl Levitt, Ph.D., Professor
Xin Liu, Ph.D., Associate Professor
Bertram Ludaescher, Ph.D., Professor
Kwan-Liu Ma, Ph.D., Professor
Charles U. Martel, Ph.D., Professor
Norman S. Matloff, Ph.D., Professor
Nelson Max, Ph.D., Professor
Prasant Mohapatra, Ph.D., Professor
Biswanath Mukherjee, Ph.D., Professor,
Distinguished Graduate Mentoring Award
Michael Neff, Ph.D., Assistant Professor
Ronald A. Olsson, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Raju Pandey, Ph.D., Associate Professor
Phillip Rogaway, Ph.D., Professor

Zhendong Su, Ph.D., Associate Professor
Ilias Tagkopoulos, Ph.D., Assistant Professor
S. Felix Wu, Ph.D., Professor

Emeriti Faculty

Lawrence T. Kou, Ph.D., Professor Emeritus
Peter Linz, Ph.D., Professor Emeritus
Richard F. Walters, Ph.D., Professor Emeritus,
Academic Senate Distinguished Teaching Award

Affiliated Faculty

Sean Davis, M.S., Lecturer

The Computer Science and Engineering Program

The Department of Computer Science administers two curricula: Computer Science and Engineering in the College of Engineering, and Computer Science in the College of Letters and Science. It also administers a minor in the College of Letters and Science. For information on the Computer Science curriculum and minor, see Computer Science, on page 206.

The field of Computer Science and Engineering encompasses the organization, design, analysis, theory, programming, and application of digital computers and computing systems. It develops versatile engineers with backgrounds spanning a broad computer hardware/software spectrum.

The Computer Science and Engineering major provides students with a solid background in mathematics, physics, chemistry, and electronic circuits and systems, all supporting the computer hardware and computer software courses that constitute the focus of the curriculum.

A key theme of this curriculum is the hardware/software interaction in today's computer systems design, a theme reflected in the balance between computer hardware and computer software aspects in the course requirements. The key theme of hardware/software interaction is also reflected in the orientation of the courses themselves. The Computer Science and Engineering major also requires additional general education electives, helping to develop the verbal skills and intellectual breadth demanded by today's employers.

The Computer Science and Engineering program prepares students to do further work in hardware, software, or electronics, either in industry or postgraduate study.

Mission. The University of California, Davis, is first and foremost, an institution of learning and teaching, committed to serving the needs of society. The Department of Computer Science contributes to the mission of the University in three ways. First, its undergraduate and graduate education programs seek to educate students in the fundamental principles of computer science and the skills needed to solve the complex technological problems of modern society; the breadth of course work provides a framework for life-long learning and an appreciation for multidisciplinary activities. Second, through its research programs, the department contributes to the development and progress of computer science, and software and information technology, to provide innovative, creative solutions for societal needs. Finally, the department disseminates its research—to enhance collaborations with the public sector, further interdisciplinary interests that benefit society, and educate the public—through publications, public service, and professional activities.

Department Objectives. *Teaching*—To provide undergraduate students with a thorough understanding of the key principles and practices of computing, which include a strong theoretical background in mathematics, basic sciences, and engineering fundamentals and an ability to apply this knowledge to practical problems. To provide students with sufficient breadth to work creatively and productively in multidisciplinary work teams; this breadth, in its broadest context, will form the basis for an appreciation and interest in life-long learning. To provide students with the ability to design and conduct experiments, and to collect and analyze data in core, as well as more specialized, areas of computer science. To provide students with breadth in the humanities and social sciences so they learn to communicate effectively, understand professional and ethical issues in society, and appreciate the interrelatedness between computing and society. To educate graduate students to be our next generation of teachers or leaders in industry, or to pursue meaningful, creative research in industry, government, or academia. *Research*—To develop and maintain research programs that produce fundamental scientific advances, as well as useful technological innovations, while simultaneously training the next generation of researchers and leaders in the field of computer science.

Objectives. To train graduates to practice computer science and engineering in a broad range of industries; to prepare interested graduates for graduate education or other professional degrees; to give students an understanding of computer software and hardware systems, and both theoretical and experimental approaches to problem solving; to ready graduates for lifelong learning; and to encourage graduates to contribute to their profession and society.

Integrated Degree Program. An integrated B.S./M.S. plan in Computer Science allows Davis students in Computer Science, Computer Science Engineering, or Computer Engineering to complete a master's degree in Computer Science in one year. Formal course work for the master's degree is reduced by 6 units for students. Students can begin graduate studies immediately after completing their B.S. degree. More information is available in the graduate section of the College of Engineering *Bulletin*, or at *http://www.cs.ucdavis.edu/graduate/bs-ms.html*.

Computer Science and Engineering Undergraduate Program

The Computer Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C-9D	19
Chemistry 2A	5
Engineering 20, 30, 40, 60	16
Computer Science Engineering 50 or Electrical and Computer Engineering 70	4
Engineering 17	4
English 3 or University Writing Program 1, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
Communication 1	4
General Education electives	25
Minimum Lower Division Units	**103**

Upper Division Requirements:

Upper Division Required Courses

Computer Science Engineering 188	4
Electrical and Computer Engineering 100, 172, and 180A	14
Computer Science Engineering 120† or 122A†	4
Computer Science Engineering 132, 140A, 150, 152A, 154A, 154B and 160	28
Computer electives—a minimum of 4 courses and a minimum of 15 units chosen from Computer Science Engineering 120†, 122A†, 122B, 124, 129, 130, 140B, 142, 145, 152B, 152C, 153, 156, 158, 163, 165A, 165B, 170, 175, 177, 178,; one course (minimum 3 units from one single course) from approved 192 or 199 or Electrical and Computer Engineering 194ABC; Electrical and Computer Engineering 180B	15
General Education electives	8
Unrestricted elective	4
Minimum Upper Division Units	**77**
Minimum Units Required for Major	**180**

† Completion of both Computer Science Engineering 120 and 122A will satisfy the computer science theory requirement and a computer elective requirement.

Courses in Engineering: Computer Science (ECS)

Lower Division Courses

10. Basic Concepts of Computing (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra. Introduction to principles of computing. Methods and algorithms for solving problems by use of a digital computer. Not open for credit to students who have completed course 30 or Engineering 6.—I, II, III. (I, II, III.) Amenta, Ludaescher, Gertz

15. Introduction to Computers (4)
Lecture—3 hours; laboratory—3 hours. Computer uses in modern society. Emphasis on uses in non-scientific disciplines. Includes word processing, spreadsheets, web-page creation, elementary programming, basic computer organization, the uses of computers and their influence on society. Not intended for computer science majors. Not open for credit to students who have completed course 30. Only two units of credit allowed to students who have completed Plant Sciences 21. GE credit: SciEng, Wrt.—I, II, III. (I, II, III.) Liu

20. Discrete Mathematics for Computer Science (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A. Discrete structures and applications in computer science. Proofs, particularly induction. Introduction to propositional logic, logic circuit design, combinatorics, recursion and solution of recurrence relations, analysis of algorithms, graph theory and trees, finite state machines. Not open for credit to students who have completed course 100.—I, II, III. (I, II, III.) Bai, Gusfield, Koehl, Max, Rogaway

30. Introduction to Programming and Problem Solving (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A (may be taken concurrently); prior experience with basic programming concepts (variable, loops, conditional statements) recommended. Introduction to computers and computer programming, algorithm design, and debugging. Elements of good programming style. Programming in the C language. Use of basic UNIX tools.—I, II, III. (I, II, III.) Bai, Wu

40. Introduction to Software Development and Object-Oriented Programming (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 30 or the equivalent with a grade of C- or better. Elements of program design, style, documentation, efficiency. Methods for debugging and verification. Operating system tools. Principles and use of object-oriented programming in C++. Basic data structures and their use.—I, II, III. (I, II, III.)

50. Computer Organization and Machine-Dependent Programming (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40. Comparative study of different hardware architectures via programming in the assembly languages of various machines. Role of system software in producing an abstract machine. Only one unit of credit allowed for students who have taken Electrical and Computer Engineering 70.—I, II, III. (I, II, III.) Farrens, Matloff

60. Data Structures and Programming (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 20, 40 (C++ and UNIX); grade of C- or better in each course. Design and analysis of data structures for a variety of applications. Trees, heaps, searching, sorting, hashing, graphs. Extensive pro-

gramming. Not open for credit to students who have completed course 110.—I, II, III. (I, II, III.) Chen, Joy, Rogaway

89A-L. Special Topics in Computer Science (1-5)
Lecture, laboratory or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Databases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networks; (J) Computer-Aided Design; (K) Scientific Computing; (L) Computer Science. May be repeated for credit when the topic is different.—I, II, III. (I, II, III.)

92. Internship in Computer Science (1-5)
Internship. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5)
(P/NP grading only.)

99. Special Study for Lower Division Students (1-5)
(P/NP grading only.)

Upper Division Courses

120. Introduction to the Theory of Computation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 20; Mathematics 108 recommended. Fundamental ideas in the theory of computation, including formal languages, computability and complexity. Reducibility among computational problems.—I, II, III. (I, II, III.) Bai, Franklin, Gusfield, Rogaway, Martel

122A. Algorithm Design and Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 20, 60. Complexity of algorithms, bounds on complexity, algorithms for searching, sorting, pattern matching, graph manipulation, combinatorial problems, randomized algorithms, introduction to NP-complete problems.—I, II, III. (I, II, III.) Gusfield, Martel, Rogaway

122B. Algorithm Design and Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 122A. Theory and practice of hard problems, and problems with complex algorithm solutions. NP-completeness, approximation algorithms, randomized algorithms, dynamic programming and branch and bound. Students do theoretical analysis, implementation and practical evaluations. Examples from parallel, string, graph, and geometric algorithms.—I. (I.) Rogaway, Gusfield, Martel

124. Theory and Practice of Bioinformatics (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 10 or 30 or Engineering 6; Statistics 12 or 13 or 32 or 100 or 131A or Mathematics 135A; Biological Science 1A or Molecular and Cellular Biology 10. Fundamental biological, mathematical and algorithmic models underlying bioinformatics; sequence analysis, database search, gene prediction, molecular structure comparison and prediction, phylogenetic trees, high throughput biology, massive datasets; applications in molecular biology and genetics; use and extension of common bioinformatics tools.—III. (III.) Filkov, Gusfield

129. Computational Structural Bioinformatics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: college level programming course; Biological Science 1A or Molecular and Cellular Biology 10. Fundamental biological, chemical and algorithmic models underlying computational structural biology; protein structure and nucleic acids structure; comparison of protein structures; protein structure prediction; molecular simulations; databases and online services in computational structural biology.—I. (I.) Koehl

130. Scientific Computation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 30 or Engineering 6; Mathematics 22A or Mathematics 67. Matrix-vector approach using MATLAB for floating point arithmetics, error analysis, interpolations, numerical integration, matrix computations, nonlinear equations and optimization. Parallel computing for matrix multiplication and the Cholesky factorization.—III. (III.) Bai, Hamann, Joy

132. Probability and Statistical Modeling for Computer Science (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 50 or Engineering Electrical and Computer 70; course 60; Mathematics 21C; Mathematics 22A or Mathematics 67. Univariate and multivariate distributions. Estimation and model building. Markov/Hidden Markov models. Applications to data mining, networks, security, software engineering and bioinformatics.—II. (II.) Davidson, Ghosal, Matloff

140A. Programming Languages (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 50 or Electrical Computer Engineering 70; course 60. Syntactic definition of programming languages. Introduction to programming language features including variables, data types, data abstraction, object-orientedness, scoping, parameter disciplines, exception handling. Comparative study of several high-level programming languages.—I, III. (I, III.) Olsson, Pandey, Su

140B. Programming Languages (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Continuation of programming language principles. Further study of programming language paradigms such as functional and logic; additional programming language paradigms such as concurrent (parallel), dataflow, and constraint; key implementation issues for those paradigms; and programming language semantics.—I. (I.) Olsson, Pandey

142. Compilers (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 20, 140A; course 120 recommended. Principles and techniques of lexical analysis, parsing, semantic analysis, and code generation. Implementation of compilers.—II. (II.) Pandey, Su

145. Scripting Languages And Their Applications (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: programming skill at the level of course 60. Goals and philosophy of scripting languages, with Perl and Python as prime examples. Applications include networking, threaded programming, and graphical user interfaces (GUI's). Offered in alternate years.—III. Matloff

150. Operating Systems and System Programming (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40; course 154A or Electrical and Computer Engineering 70; course 154B or Electrical and Computer Engineering 170 strongly recommended. Basic concepts of operating systems and system programming. Processes and interprocess communication/synchronization; virtual memory, program loading and linking; file and I/O subsystems; utility programs. Study of a real operating system.—I, II, III. (I, II, III.) Levitt, Matloff, Wu

152A. Computer Networks (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 60; Mathematics 135A or Statistics 131A or Statistics 120 or Statistics 32. Overview of local and wide-area computer networks. IS0 seven-layer model. Physical aspects of data transmission. Data-link layer protocols. Network architectures. Routing. TCP/IP protocol suite. Local area networks. Medium access protocols. Network performance analysis. Only two units of credit for students who have taken course 157. (Same course as Electrical and Computer Engineering 173A.)—I, III. (I, III.) Chuah, Ghosal, Liu, Matloff, Mohapatra, Mukherjee

152B. Computer Networks (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 152A, 150. TCP/IP protocol suite, network layer protocols, transport layer protocols, transport layer interfaces, sockets, UNIX network programming, computer networking applications, remote procedure calls and network management.—I, II, III. (I, II, III.) Mukherjee, Ghosal, Matloff, Mohapatra

152C. Design Projects in Communication Networks (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 152A or Electrical and Computer Engineering 173A. Advanced topics and design projects in communication networks. Example topics include wireless networks, multimedia networking, network design and management, traffic analysis and modeling, network simulations and performance analysis. Offered in alternate years. (Same course as Electrical and Computer Engineering 173B.)—(III.) Chuah, Liu, van der Schaar, Mukherjee

153. Computer Security (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 150 and 152A. Principles, mechanisms, and implementation of computer security and data protection. Policy, encryption and authentication, access control, and integrity models and mechanisms; network security; secure systems; programming and vulnerabilities analysis. Study of an existing operating system. Not open for credit to students who have completed course 155.—II, III. (II, III.) Bishop, Chen

154A. Computer Architecture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 50 or Electrical and Computer Engineering 70; and course 110. Introduction to digital design. Interfacing of devices for I/O, memory and memory management. Input/output programming, via wait loops, hardware interrupts and calls to operating system services. Hardware support for operating systems software. Only one unit of credit allowed for students who have taken Electrical and Computer Engineering 170.—I, II, III. (I, II, III.) Farrens

154B. Computer Architecture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 154A or Electrical and Computer Engineering 170; and course 110. Hardwired and microprogrammed CPU design. Memory hierarchies. Uniprocessor performance analysis under varying program mixes. Introduction to pipelining and multiprocessors. I, II, III. (I, II, III.) Farrens

155. Computer Security for Non-Majors (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: programming skill at the level of course 30; Mathematics 21C. Principles, mechanisms, implementation, and sound practices of computer security and data protection. Cryptography. Authentication and access control. Internet security. Malicious software. Common vulnerabilities. Practical security in everyday life. Not open for credit to students who have completed course 153.—I. (I.) Chen, Bishop

156. Discrete-Event Simulation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: programming skill at the level of course 60; calculus-based course in probability theory, such as Statistics 120 or 130A or 131A or Mathematics 135A or Engineering Civil and Environmental 114. Design of discrete-event simulation software. Random number generators. Event, process and activity-scanning approaches. Data structures and algorithms for event lists. Statistical output analysis. Applications to computer systems and networks; reliable systems; transportation; business management.—I. (I.) Matloff

157. Computer Networks for Non-Majors (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: programming skills on the level of course 30. Shorter version of course 152AB featuring World Wide Web and e-mail examples. Local and wide-area computer network structures. ISO seven-layer model. Network protocols for data transmission and internetworking. Introduction to basic TCP/IP and Web programming. No credit allowed to students who have completed courses 152A or 152B.—III. (III.) Ghosal, Liu, Matloff, Mohapatra, Mukherjee

158. Programming on Parallel Architectures (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150; course 154B recommended. Techniques for software development using the shared-memory and message-passing paradigms, on parallel architectures and networks of workstations. Locks, barri-

ers, and other techniques for synchronization. Introduction to parallel algorithms.—III. (III.) Farrens, Ma, Matloff, Pandey

160. Introduction to Software Engineering (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Requirements, specification, design, implementation, testing, and verification of large software systems. Study and use of software engineering methodologies. Team programming.—I, II, III. (I, II, III.) Levitt, Devanbu

163. Information Interfaces (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 60; 175 recommended. Art and science of information visualization and interfaces for information systems. Design principles of human-computer interaction. Visual display and navigation of nonspatial and higher dimensional data. Implementations, performance issues, tradeoffs, and evaluation of interactive information systems.—III. (III.) Amenta, Ma

165A. Database Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 60. Database design, entity-relationship and relational model, relational algebra, query language SQL, storage and file structures, query processing, system architectures.—II. (II.) Gertz, Ludaescher

165B. Database Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 165A. Advanced database systems: object-oriented and object-relational database systems; distributed and multidatabase systems; advanced database applications: Web-based database access, data warehouses.—III. (III.) Gertz, Ludaescher

166. Scientific Data Management (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: programming skills at course level 40; Mathematics 21C. Relational databases, SQL, non-standard databases, XML, scientific workflows, interoperability, data analysis tools, metadata.—I. (I.) Gertz, Ludaescher

170. Introduction to Artificial Intelligence (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Design and implementation of intelligent computer systems. Knowledge representation and organization. Memory and inference. Problem solving. Natural language processing.—II. (II.) Davidson, Levitt

173. Image Processing and Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 60; Mathematics 67 or C- or better in Mathematics 22A. Techniques for automated extraction of high-level information from images generated by cameras, three-dimensional surface sensors, and medical devices. Typical applications include automated construction of 3D models from video footage and detection of objects in various types of images.—II. (II.) Amenta

175. Computer Graphics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 60; Mathematics 22A or Mathematics 67A. Principles of computer graphics. Principles of computer graphics. Current graphics hardware, elementary operations in two-and three-dimensional space, transformational geometry, clipping, graphics system design, standard graphics systems, individual projects.—I, II. (I, II.) Amenta, Hamann, Joy

177. Introduction to Visualization (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 175. Graphics techniques for generating images of various types of measured or computer-simulated data. Typical applications for these graphics techniques include study of air flows around car bodies, medical data, and molecular structures.—II. (II.) Joy, Hamann, Ma

178. Introduction to Geometric Modeling (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 175. Interactive graphics techniques for defining and manipulating geometrical shapes used in computer animation, car body design, aircraft design, and architectural design.—I. (I.) Joy, Hamann, Max

188. Ethics and the Information Age (4)
Lecture/discussion—4 hours. Prerequisite: upper division standing. Foundations of ethics. Views of technology. Technology and human values. Costs and benefits of technology. The character of technological change. The social context of work in computer science and engineering.—I, II, III. (I, II, III.) Chen, Devanbu, Mukherjee, Rogaway

189A-M. Special Topics in Computer Science (1-5)
Lecture, laboratory or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Data Bases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networks; (J) Computer-Aided Design; (K) Scientific Computing; (L) Computer Science; (M) Computer Security. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

190C. Research Group Conferences in Computer Science (1)
Discussion—1 hour. Prerequisite: upper division standing in Computer Science and Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

190X. Senior Seminar (2)
Seminar—2 hours. Prerequisite: senior standing. Examination of a special topic in a small group setting.

192. Internship in Computer Science (1-5)
Internship. Prerequisite: completion of a minimum of 84 units; project approval prior to period of internship. Supervised work experience in computer science. May be repeated for credit. (P/NP grading only.)

197T. Tutoring in Computer Science (2-3)
Discussion—1 hour; laboratory/discussion—3-6 hours. Prerequisite: upper division standing, consent of instructor. Tutoring in computer science courses, especially introductory courses. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

The Graduate Program in Computer Science

Doctoral and Masters degrees in Computer Science are offered through the interdisciplinary Graduate Group in Computer Science. Please see *http://www.cs.ucdavis.edu* and Computer Science (A Graduate Group), on page 207, for a description of graduate education offerings, requirements, group faculty and research foci.

Graduate Courses

201A. Advanced Computer Architecture (4)
Lecture—3 hours; term paper. Prerequisite: course 154B or Electrical and Computer Engineering 170; course 150. Modern research topics and methods in computer architecture. Design implications of memory latency and bandwidth limitations. Performance enhancement via within-processor and between-processor parallelism. Term project involving student-proposed extensions/modifications of work in the research literature. Not open for credit to students who have completed course 250A.—I. Farrens

201B. High-Performance Uniprocessing (4)
Lecture—3 hours; term paper. Prerequisite: course 201A. Maximizing uniprocessor performance. Barriers to high performance; solutions to the problems; historical and current processor designs. Not open for credit to students who have completed course 250B.—II. Farrens

201C. Parallel Architectures (4)
Lecture—3 hours; project—1 hour. Prerequisite: course 201A. Evolution of parallel architectures from special-purpose machines to commodity servers. Emphasis on recent machines and applications that drive them. Not open for credit to students who have completed course 250C.—III.

203. Novel Computing Technologies (4)
Lecture—3 hours; project—1 hour. Prerequisite: course 201A. Novel computing technologies that could revolutionize computer architecture. Quantum computing technologies, including algorithms, devices, and fault tolerance. A survey of other unconventional technologies including nanoscale electronics, MEMS devices, biological devices, and nanotechnology. Offered in alternate years.—II.

220. Theory of Computation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 120, 122A. Time and space complexity classes. Reductions, completeness, and the role of randomness. Logic and undecidability.—III. Rogaway

222A. Design and Analysis of Algorithms (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 122A; Statistics 131A recommended. Techniques for designing efficient algorithms, analyzing their complexity and applying these algorithms to a broad range of applications. Methods for recognizing and dealing with difficult problems.—I, II. (I, II.) Amenta, Franklin, Gusfield, Martel, Rogaway

222B. Advanced Design and Analysis of Algorithms (4)
Lecture—3 hours; project—1 hour. Prerequisite: course 222A. Advanced topics in complexity theory. Problem classification. The classes P, NP, P-space, co-NP. Matching and network flow algorithms. Matrix multiplication. Approximation algorithms.—III. (III.) Gusfield, Franklin, Martel, Rogaway

223. Parallel Algorithms (4)
Laboratory/discussion—3 hours; project—1 hour. Prerequisite: course 222A. Models of parallel computer systems including PRAMs, loosely coupled systems and interconnection networks. Parallel algorithms for classical problems and general techniques for their design and analysis. Proving lower bounds on parallel computation in several settings.—II. (II.) Martel

224. String Algorithms and Applications in Computational Biology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 122A. Algorithms that operate on strings. Pattern matching, sets of patterns, regular expression pattern matching, suffix trees and applications, inexact similarity, parametric sequence alignment, applications to DNA sequencing and protein database searching. Offered in alternate years—I, III. Gusfield, Filkov

225. Graph Theory (3)
Lecture—3 hours. Prerequisite: graduate standing in electrical engineering or computer science or consent of instructor. Fundamental concepts. Vector spaces and graphs. Planar graphs: Whitney's and Kuratowski's theorems. Topological parameters: packings and coverings. Connectivity: Menger's theorem. Hamilton graphs: Posa's and Chvatal's theorems. Graph factorization: Tutte's theorem. Graph coloring: Brooks; and Vizing's theorem.—II. (II.) Franklin

226. Computational Geometry (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 175, 222A. Mathematics of unstructured data. Algorithms for data structures such as Voronoi diagrams, oct-trees, and arrangements. Applications in computer graphics, concentrating on problems in three-dimensions. Offered in alternate years.—III. Amenta, Max

227. Modern Cryptography (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 220 or 222A. Modern cryptography as a discipline emphasizing formal definitions and proofs

of security. One-way functions, pseudo-randomness, encryption, digital signatures, zero-knowledge, secure protocols.—II. (II.) Rogaway

228. Cryptography for E-Commerce (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 222A. Cryptographic primitives and protocols of importance to e-commerce, present and future, including content distribution mechanisms, payment mechanisms, pricing mechanisms, anonymity and privacy mechanisms, fair exchange mechanisms. Offered in alternate years.—II. Franklin

229. Advanced Computational Structural Bioinformatics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing. Algorithmic problems in structural biology; protein structure classification; protein structure prediction (including comparative modeling and ab initio protein structure prediction); molecular simulations (molecular dynamics and Monte Carlo simulations).—II. (II.) Koehl

230. Applied Numerical Linear Algebra (4)
Laboratory/discussion—3 hours; discussion—1 hour. Prerequisite: course 130 or Engineering Applied Science 209 or Mathematics 167. Numerical linear algebra (NLA) with emphasis on applications in engineered systems; matrix factorizations; perturbation and rounding error analyses of fundamental NLA algorithms. Offered in alternate years.—(I.) Bai

231. Large-Scale Scientific Computation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130. Algorithms and techniques for large-scale scientific computation, including basics for high performance computing, iterative methods, discrete approximation, fast Fourier transform, Poisson solvers, particle methods, spectral graph partition and its applications. Offered in alternate years.—II. Bai

234. Computational Functional Genomics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 124; graduate standing in Computer Science or Life Sciences. Bioinformatics methods for analysis and inference of functional relationships among genes using large-scale genomic data, including methods for integration of gene expression, promoter sequence, TF-DNA binding and other data, and approaches in modeling of biological networks.—II. (II.) Filkov

235A. Computer and Information Security (4)
Lecture—3 hours; project. Prerequisite: course 150; course 152A recommended. Modern topics in computer security, including: protection, access control, operating systems security, network security, applied cryptography, cryptographic protocols, secure programming practices, safe languages, mobile code, malware, privacy and anonymity, and case studies from real-world systems. Not open for credit to students who have taken course 235.—I. (I.) Chen

235B. Foundations of Computer and Information Security (4)
Lecture—3 hours; project. Prerequisite: course 235A; courses 120, 150 recommended. Theoretical foundations of methods used to protect data in computer and communication systems. Access control matrix and undecidability of security; policies; Bell-LaPadula, Biba, Chinese Wall models; non-interference and non-deducibility; information flow and the confinement problem. Not open for credit to students who have taken course 235.—II. (II.) Bishop

236. Computer Security: Intrusion Detection Based Approach (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150; course 153 recommended. Concepts of intrusion detection, anomaly detection based on machine learning, signature-based detection using pattern matching, automated response to attacks using artificial intelligence planning, tracing intruders based on principal component analysis, security policy languages. Offered in alternate years.—I. Levitt

240. Programming Languages (4)
Lecture—3 hours; discussion—1 hour. Prerequisites: courses 140A, 142. Advanced topics in programming languages, including formal syntax and semantics, the relation between formal semantics and verification, an introduction to the lambda calculus. Additional topics will include language design principles, alternative programming languages, in-depth semantic theory and models of language implementation.—II. (II.) Pandey

242. Translation of Programming Languages (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 240. Lexical analysis, parsing, storage management, symbol table design, semantic analysis and code generation. LR, LALR grammars. Compiler-compilers.—III. (III.) Pandey

243. Code Generation and Optimization (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 201A or Engineering Electrical and Computer 270. Compiler optimizations for performance, code size and power reduction. Topics include control- and data-flow analysis, redundancy elimination, loop and cache optimizations, register allocation, local and global instruction scheduling, and modulo scheduling.—II. (II.) Wilken

244. Principles of Concurrent Programming (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 20, 150. Fundamental concepts and applications of concurrent programs; concurrent program verification and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages.—I. (I.) Olsson, Pandey, Su

247. Concurrent Programming Languages (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 140A, 150. Language design parameters. Models of parallel machines. Load balancing. Scalability. Portability. Efficiency measures. Design and implementation techniques for several classes of concurrent programming languages (such as object-oriented, functional, logic, and constraint programming languages).—I. (I.) Pandey, Olsson, Su

251. Operating Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. Models, design, implementation, performance evaluation in operating systems. Algorithms, internal architectures for single processor OS and distributed systems. Concurrency control, recovery, security. OS kernel-level programming. Special topics embedded systems, real-time system, device driver, NPU (Network Processor Unit).—III. (III.) Pandey, Wu

252. Computer Networks (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 152B. Internet protocol based computer networks applications, transport, network layer protocols. High speed LAN technologies: Ethernet, Asynchronous Transfer Mode (ATM). Delay models in data networks: analysis of multiaccess techniques in polling, ring, random access networks. Multimedia applications requirements and design.—II. Mukherjee, Mohapatra, Ghosal

255. Resource Management in Wireless Communication Networks (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 252A. Advanced research issues in wireless communication networks, including multi-user diversity and cross-layer optimization, basic network information theory, MIMO systems and the impact on networks, and dynamics spectrum management. Offered in alternate years.—III. Liu

256. Performance Evaluation (4)
Lecture—3 hours; project—1 hour. Prerequisite: courses 20, 152A, 154A-154B or Electrical and Computer Engineering 170, Statistics 131A; course 150 recommended. Use of simulation and queueing theory in computer and communication system design. Applications to processor scheduling, memory hierarchies; I/O systems; packet and circuit switched networks; fault-tolerance; computer networks applications. Not open for credit to students who have completed course 256A.—I, II. (I, II.) Matloff, Ghosal, Mohapatra, Mukherjee

257. Mobile and Wireless Networks (4)
Lecture—3 hours; independent study. Prerequisite: course 252. Fundamental techniques in design of second generation wireless networks: cellular network and protocols, medium access techniques, handoff control, signaling and mobility management, wireless data works, Internet mobility and Personal Communication Services (PCS). Third generation wideband systems, novel technologies, adhoc networks. Offered in alternate years.—I. Ghosal, Mohapatra, Mukherjee

258. Networking Architecture and Resource Management (4)
Lecture—3 hours; project—1 hour. Prerequisite: course 152A or Electrical & Computer Engineering 173A; course 252 recommended. Design and implementation principles of networking architecture and protocols. Internet, ATM, and telephony case studies. Topics: Internet technology; application and services; resource management; Quality of Service (QoS) provisioning; traffic engineering; performance evaluation and future research issues. (Same course as Electrical & Computer Engineering 273.)—II. (II.) Chuah, Mohapatra

259. Optical Networks (4)
Lecture—3 hours; independent study. Prerequisite: course 252. Optical networks. Enabling technologies. Multiplexing techniques. WDM. Broadcast networks. Wavelength-routed networks. Network architectures. Protocols. Network algorithms. Device-network interface. Optimization problems.—I. (I,) Mukherjee, Ghosal

260. Software Engineering (4)
Lecture—3 hours; project. Prerequisite: course 142; course 160 recommended. Advanced techniques for domain-specific software reuse.—I. (I.) Devanbu

261. Program Verification (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic; knowledge of an iterative and functional programming language. Methods of proving correctness of programs with respect to formal specifications, with attention to those suited for employing automated deduction. Logic background, symbolic execution, techniques suited to iterative programming, methods from denotational semantics, termination, dynamic logic and proofs of concurrent programs.—I. (I.) Levitt

262. Formal Specification (3)
Lecture—3 hours. Prerequisite: course 261. Formal specification of modules, and its relationship to top-down programming development and verification. Abstract data types, together with methods for specifying them. Implementations and proofs of implementation. Using specifications to reason about programs. Parameterized types. Constructing good formal specifications. Offered in alternate years.—II. Levitt

265. Distributed Database Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 165A. Concepts of distributed database systems and architectures, distributed database design, distributed query processing and optimization, transaction management and concurrency control, heterogeneous and multidatabase systems.—I, III. (III.) Gertz, Ludaescher

266. Spatial Databases (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 165A. Concepts, models, and architectures for spatial databases, spatial access methods, query processing, spatio-temporal data management, moving objects, spatial data mining. Offered in alternate years.—(II.) Gertz, Ludaescher

267. Wide-Area Distributed Information Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 152B or 165A. Wide-area distributed information systems, data broadcast, multicast, publish/

subscribe, service differentiation, information retrieval, Web caching. Offered in alternate years.—III. Askoy

268. Scientific Data And Workflow Management (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 165A. Scientific data integration, metadata, knowledge representation, ontologies, scientific workflow design and management. Offered in alternate years.—(II.) Gertz, Ludaescher

270. Artificial Intelligence (3)
Lecture—3 hours. Prerequisite: courses 140A, 172. Concepts and techniques underlying the design and implementation of models of human performance on intelligent tasks. Representation of high-level knowledge structures. Models of memory and inference. Natural language and story understanding. Common sense planning and problem solving.—II. (II.) Davidson, Levitt

271. Machine Learning and Discovery (4)
Lecture—3 hours; project—1 hour. Prerequisite: course 170. Artificial intelligence techniques for knowledge acquisition by computers. Fundamental problems in machine learning and discovery. Systems that learn from examples, analogies, and solved problems. Systems that discover numerical laws and qualitative relationships. Projects centering on implementation and evaluation.—III. Levitt, Vemuri

272. Information Visualization (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 163 or 175 recommended. Advanced topics in information visualization: perceptually effective display methods, color design and selection, interaction models and techniques, focus-context techniques, distortion methods, large graph visualization techniques, visual data mining methods, and evaluation methods.—II. (II.) Ma

273. Applied Visual Computing (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: graduate standing. Visual computing paradigms, current visualization technologies, principles of 3-D graphics, user interface designs, and exploratory visualization. Offered in alternate years.—I. Hamann, Joy, Ma, Max

274. Automated Deduction (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic. Techniques of mechanical theorem proving. Methods based on resolution and term-rewriting. Decision procedures. Induction. Applications to program verification, question/answering and plan generation. Study existing mechanical theorem provers. Offered in alternate years.—III. Levitt

275A. Advanced Computer Graphics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Advanced topics in computer graphics. Hidden surface models, rendering of various surface types, subdivision methods, shading techniques, anti-aliasing, modeling techniques.—II. (II.) Joy, Hamann, Ma

275B. Advanced Computer Graphics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175 or 177 or 178. Advanced topics in computer graphics and geometric modeling. Topics taken from advanced research papers in computer graphics, image synthesis, visualization and geometric modeling. Discussion of current research in the field. Offered in alternate years.—(II.) Joy, Hamann, Ma

276. Advanced Volume Visualization (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 177. Applications, available tools and techniques, the challenges confronting the field of volume visualization, and some of the advanced topics in the field. Primary emphasis on advanced software and hardware techniques to achieve interactive visualization.—III. (III.) Hamann, Joy, Ma, Max

277. Advanced Visualization (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 177. Visualization of 3D data, including scalar fields, vector fields, and medical data.—III. (III.) Hamann, Joy

278. Computer-Aided Geometric Design (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 175. Mathematical techniques for the definition and manipulation of curves and surfaces. Bezier curves and surfaces, B-spline curves and surfaces, subdivision surfaces, wavelets. Integration into various computer graphics rendering models, visualization systems and computer-aided design systems. Offered in alternate years.—(III.) Joy, Hamann

279. Computer Animation (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 175 or 275. Course surveys current research and fundamental techniques that lie behind character animation tools. Emphasis on improving expressive aspects of movement and how physics, motion capture data, the arts and psychology literature, and interactive techniques can be used towards this goal. Offered in alternate years.—II. Neff

280. Virtual Reality Technology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 175. Fundamentals and principles of Virtual Reality (VR) technology. Potential and limits for its useful application. Developing a complete virtual reality application. Offered in alternate years.—III. Joy

289A-N. Special Topics in Computer Science (1-5)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Data Bases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networks; (J) Computer-Aided Design; (K) Scientific Computing; (L) Computer Science; (M) Security; (N) Bioinformatics and Computational Biology. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

290. Seminar in Computer Science (1)
Seminar—1 hour. Participating seminar; discussion and presentation of current research and development in computer science. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Graduate Research Group Conference (1)
Discussion—1 hour. Research problems, progress and techniques in computer science. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

293A. Research in Computer Science (1)
Lecture—1 hour. Prerequisite: graduate standing in computer science. Study of research topics in computer science, Ph.D. level research methodologies (experimental, applied and theoretical). Study skills necessary to successfully find/solve significant research problems. Finding and successful interacting with a research advisor. Ethical issues in research/collaborative work. (S/U grading only.)—I. (I.) Martel

293B. Research in Computer Science (1)
Lecture—1 hour. Prerequisite: graduate standing in computer science; course 293A recommended. Study of Ph.D. level research methodologies (experimental, applied and theoretical), presenting research results for the computer science community. Study skills necessary to successfully find/solve significant research problems. (S/U grading only.)—II. (II.) Martel

298. Group Study (1-5)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Courses

390. The Teaching of Computer Science (1)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Computer Science. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

Engineering: Electrical and Computer Engineering

(College of Engineering)

Richard A. Kiehl, Ph.D., Chairperson of the Department

Stephen H. Lewis, Ph.D., Vice Chairperson for Undergraduate Studies

Chen-Nee Chuah, Ph.D., Vice Chairperson for Graduate Studies

Department Office. 2064 Kemper Hall
(530) 752-0583; *http://www.ece.ucdavis.edu*

Faculty

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Venkatesh Akella, Ph.D., Professor
Hussain Al-Asaad, Ph.D., Associate Professor
Rajeevan Amirtharajah, Ph.D., Associate Professor
Bevan Baas, Ph. D., Associate Professor
G. R. Branner, Ph.D., Professor
Tsu-Shuan Chang, Ph.D., Professor
Chen-nee Chuah, Ph.D., Professor
K. Wayne Current, Ph.D., Professor
Zhi Ding, Ph.D., Professor
Gary E. Ford, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Soheil Ghiasi, Ph.D., Associate Professor
A. Nazli Gündes, Ph.D., Professor
Charles E. Hunt, Ph.D., Professor
Paul J. Hurst, Ph.D., Professor
Saif Islam, Ph.D., Associate Professor
Academic Senate Distinguished Teaching Award
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Andre Knoesen, Ph.D., Professor
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John Owens, Ph.D., Associate Professor
Ahn-Vu Pham, Ph.D., Professor
Anna Scaglione, Ph.D., Associate Professor
Richard R. Spencer, Ph.D., Professor
Kent Wilken, Ph.D., Professor
S.J. Ben Yoo, Ph.D., Professor
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Robert W. Bower, Ph.D., Professor Emeritus
John N. Churchill, Ph.D., Professor Emeritus
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Richard C. Dorf, Ph.D., Professor Emeritus
Herman J. Fink, Ph.D., Professor Emeritus
William A. Gardner, Ph.D., Professor Emeritus
Mohammed S. Ghausi, Ph.D., Professor Emeritus/Dean Emeritus
Jonathan P. Heritage, Ph.D., Professor Emeritus
T.C. Steve Hsia, Ph.D., Professor Emeritus
Vojin G. Oklobdzija, Ph.D., Professor Emeritus
G.R. Redinbo, Ph.D., Professor Emeritus
Ronald F. Soohoo, Ph.D., Professor Emeritus
Shih-Ho Wang, Ph.D., Professor Emeritus

Affiliated Faculty

Ivor Brodie, Ph.D., Adjunct Professor
Shu Lin, Ph.D., Adjunct Professor

Diego Yankelevich, Ph.D., Associate Adjunct Professor

The Electrical and Computer Engineering Undergraduate Programs

The department administers two undergraduate curricula in the College of Engineering: *(1)* the Electrical Engineering curriculum and *(2)* the Computer Engineering curriculum.

The Electrical Engineering and the Computer Engineering curricula are both accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.

Integrated Degree Program (IDP). The IDP leads to both the Bachelor of Science and the Master of Science degrees. The program provides a student the opportunity to obtain superior breadth and depth of technical material. The IDP program in the Department of Electrical and Computer Engineering is available only to UC Davis undergraduates with strong academic records enrolled in the Electrical Engineering, Computer Engineering, Electronic Materials Engineering or Physics curricula. Applicants in their junior year must apply for the IDP by March 31. For more information on IDP, see *http://www.ece.ucdavis.edu*.

Mission. Under its land grant status, the University of California has a mission to provide the state with the trained workforce it needs and to advance knowledge and research in directions that contribute to the general welfare of the state and the nation. The Department of Electrical and Computer Engineering contributes to the mission of the University in three ways: First, its undergraduate and graduate education programs seek to provide students with an understanding of the fundamental principles of electrical and computer engineering, the skills needed to solve the complex technological problems of modern society and the ability to continue to learn and develop throughout their careers. Second, through its research programs, the department contributes to the development and progress of electronics, communications, and computer technology. Finally, the department helps to transfer research results to industry through publication, public service and professional activities.

Objectives. *Teaching*—To provide undergraduate students with sufficient breadth to allow them to participate in teams, continue their own education after graduation and select a focus area intelligently; to provide undergraduate students with sufficient depth in a narrower discipline to allow them to develop the ability to solve complex engineering problems; to educate the students in the graduate program to be leaders in industry or to do meaningful research in industry, government or academia. *Research*—To develop and maintain research programs that produce useful technological advances while simultaneously training the next generation of researchers and leaders; to update and/or shift the foci of these programs frequently in response to the needs of our constituency and the nation; to provide a stimulating environment that encourages our graduate students to develop their abilities as far as possible.

Electrical Engineering Undergraduate Program

The Electrical Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

Electrical Engineering involves the design, analysis, and effective use of electrical systems including electronic computers. Electrical systems and computers play a central role in nearly all aspects of modern life, including communication, medicine, education, environmental protection, space exploration, defense, and home entertainment.

Students who complete the Electrical Engineering curriculum will obtain a Bachelor of Science in Electrical Engineering, one of the engineering degrees recognized in all fifty states as eligible for registration as a Professional Engineer.

Objectives. The Electrical Engineering program has adopted the following objectives to serve the long-term interests of our students and the industries of Northern California and the nation. *Foundation*—To provide our graduates with a solid foundation in engineering science, including mathematics, physical science, and the fundamentals of electrical engineering. This foundation is necessary to succeed in more advanced engineering courses and to be able to continue learning throughout a career. *Breadth*—To provide our graduates the sufficient breadth in electrical engineering in order to understand engineering tradeoffs that cross disciplines, to contribute effectively to multidisciplinary projects and to make an informed decision about their area of specialization. *Depth*—To provide our graduates with sufficient depth in a specific area of electrical engineering necessary to solve complex real-world engineering problems and to contribute to a specific discipline within electrical engineering. *Ethics*—To provide our graduates with a basic understanding of, and ability to handle correctly, ethical problems that may arise during their careers. To provide them with an understanding of their obligations to society at large.

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

Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C-9D	19
Chemistry 2A	5
Computer Science Engineering 30, 40	8
Engineering 6	4
Electrical and Computer Engineering 1	1
Electrical and Computer Engineering 70 or Computer Science Engineering 50	4
Engineering 17	4
English 3 or University Writing Program 1, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
Communication 1 or 3	4
General Education electives	16
Unrestricted electives	3
Minimum Lower Division Units	**94**

Upper Division Requirements: Electrical Engineering Curriculum

Areas of Specialization

For updated recommended courses, see department website at *http://www.ece.ucdavis.edu/undergrad/undergradhandbook.html*.

Physical Electronics: solid-state devices, circuits and fabrication and the theory courses supporting those subjects.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 130B, 140B
Design Electives with Lab: Electrical and Computer Engineering 118, or 132A, 132B or 135. Select remaining upper-division design electives from Electrical and Computer Engineering 110B, 146A, 146B
Technical electives: Electrical and Computer Engineering 112, 180B

Suggested Advisers: C.E. Hunt, S. Islam, R.A. Kiehl

Electromagnetics: microwave circuits and systems, and fiber optical systems.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 130B, 140B
Design Electives with Lab: Electrical and Computer Engineering 132A, 132B. Select remaining upper-division design electives from Electrical and Computer Engineering 110B, 132C, 135
Technical electives: Select from Electrical and Computer Engineering 112 and 133

Suggested Advisers: G.R. Branner, A. Knoesen, A. Pham, B. Yoo

Analog Electronics: transistor- and system-level analog circuit design.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 110B, 140B, 150B
Design Electives with Lab: at least two from Electrical and Computer Engineering 112, 157A, 165, 195A-195B
Select remaining upper-division design electives from Electrical and Computer Engineering 118, 132A, 132B, 132C, 151, 157B, 160, 210
Technical electives: Select from Electrical and Computer Engineering 130B, 146A

Suggested Advisers: R. Amritharajah, K.W. Current, P.J. Hurst, S.H. Lewis, S.D. O'Driscoll, R.R. Spencer

Digital Electronics: transistor- and system-level digital circuit design.

Recommended elective courses:

Core electives: Electrical and Computer Engineering 110B, 140B, 150B
Design Electives with Lab: Electrical and Computer Engineering 118 and 180B or 151 or 172 or 183 or 195A-195B
Select remaining upper-division design electives from Electrical and Computer Engineering 116, 170 or 171
Select remaining upper-division design electives from Electrical and Computer Engineering 116, 170 or 171
Technical electives: Select from Electrical and Computer Engineering 130B and 112 or 146A or 157A or 160 or 210

Suggested Advisers: R. Amritharajah, K.W. Current, P.J. Hurst, S.H. Lewis, S.D. O'Driscoll

Communication Controls and Signal Processing: digital communication, robotics, classical controls and communication, wireless and cellular digital communication systems, signal and image processing, and computer vision.

Recommended elective courses:

Core electives: Electrical and Computer Engineering, 150B, 180B
Design Electives with lab: Electrical and Computer Engineering 151, 157A and 157B or 165
Select remaining upper-division design electives from Electrical and Computer Engineering 158 or 160
Technical Electives: select from Electrical and Computer Engineering 112, 195A-195B

Suggested Advisers: T.S. Chang, Z. Ding, G.E. Ford, A.N. Gündes, B.C. Levy, A. Scaglione, Q. Zhao

Upper Division Required Courses

Electrical and Computer Engineering 100, 110A, 130A, 140A, 150A, 161, 180A, 196 31
Engineering 160, 190 or Computer Science Engineering 188 3-4
Upper-division electives*** 27
Chose at least seven courses for a minimum of 27 units from the following:
Two core electives: Electrical and Computer Engineering 110B*, 130B, 140B, 150B, 157A*, 160*, 170*, 180B*
Design laboratory electives: At least two design electives with lab: Electrical and Computer Engineering 112, 116, 118, 132A, 132B, 132C, 135, 136A, 136B, 146A, 146B, 151, 152, 157A, 157B, 165, 172, 180B, 181A-181B (must be taken in consecutive quarters), 183, 194A-194B-194C (must be taken in consecutive quarters), 195A-195B (must be taken in consecutive quarters);
At least one design project course**: course with "Design Project" in the title,

including Electrical and Computer Engineering 136A-136B, 181A-181B, 193A-193B, 194A-194B-194C, 195A-195B;
The remaining design electives may be chosen from the lists above or from the following courses: Electrical and Computer Engineering 133, 158, 171, 173A; Computer Science and Engineering 150, 152B, 163, 175, 177, 178
Technical electives***, ****..... 9
General Education electives..... 8
Unrestricted electives 7-8
Minimum Upper Division Units 86

Minimum Units Required for Major 180

* Maximum of one course appearing on both the core elective list and the design elective list may be counted in both categories.

** Courses appearing on both the laboratory elective list and on the project elective list may be counted toward both the laboratory requirement and the project requirement simultaneously.

*** Computer Science Engineering 154B may be substituted for Electrical and Computer Engineering 170.

**** After completion of the upper division elective requirement (at least 7 courses, 2 core, 2 with labs, 1 project) any units in excess of 27 will count toward the technical elective requirement; Computer Science Engineering 157 may NOT be counted toward the technical elective requirement.

Computer Engineering Undergraduate Program

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

Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22AL-22B	7
Physics 9A-9B-9C-9D	19
Chemistry 2A	5
Computer Science Engineering 20, 30, 40, 60	16
Electrical and Computer Engineering 1	1
Electrical and Computer Engineering 70 or Computer Science Engineering 50	4
Engineering 17	4
English 3 or University Writing Program 1, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
Communication 1 or 3	4
General Education electives	16
Total Lower Division Units	**96**

Upper Division Required Courses

Electrical and Computer Engineering 100, 110A, 140A, 161, 170*, 172, 173A, 180A, 180B, 196..... 40
Computer Science Engineering 122A, 150..... 8
Engineering 160, 190, or Computer Science Engineering 188..... 3-4
Upper-Division Elective Courses: 7-10
One design project course**: course with "Design Project" in the title, including: Electrical and Computer Engineering 193A-B, 194A-194B-194C, 195A-195B**
One upper division ECE or CS course (excluding CS 157)
Technical electives**, ... 9
General Education electives..... 8
Unrestricted electives 5-9
Minimum Upper Division Units 81

Minimum Units Required for Major 180

* Computer Science Engineering 154B may be substituted for the Electrical and Computer Engineering 170 requirement.
** Computer Science Engineering 157 may not be counted toward the technical elective requirement.

The Graduate Program in Electrical and Computer Engineering

M.S. and Ph.D.
http://www.ece.ucdavis.edu
(530) 752-8251

The Department of Electrical and Computer Engineering prepares graduate students to do meaningful research and acquire skills and insights vital to solving some of the world's most complex technological problems. Our graduate program offers a challenging and stimulating environment, covering optical, wireline and wireless communications, telecommunication networks, computer engineering, circuits, electromagnetics, physical electronics, optoelectronics, control, and signal processing. The depth of resources in the study of circuit design alone, with one of the largest faculty groups in the field in the UC system, distinguishes us from other programs, while our program in microwave communications and devices is unique.

The Electrical and Computer Engineering Graduate Program benefits from the highly interdisciplinary culture at UC Davis and attracts faculty from biomedical, chemical, electrical, computer, civil, and mechanical engineering, as well as computer science and mathematics.

Many of our graduates go on to leadership and technology management roles in industry, returning each year for our industrial affiliates meeting to network with other industry representatives, current students and faculty.

Generous financial support is available in the form of research assistantships, teaching assistantships, fellowships and financial aid.

Research Highlights:

- Communications, Control, Networking, and Signal Processing
- Computer Engineering
- Electronic Circuits
- Optoelectronics
- RF, Micro- and Millimeter Waves
- Physical Electronics

Research Facilities and Partnerships:

- Center for Information Technology in the Interest of Society
- Northern California Center for Nanotechnology
- Center on Polymer Interfaces and Macromolecular Assemblies
- Lawrence Livermore National Laboratory
- Lawrence Berkeley National Laboratory
- Los Alamos National Laboratory
- California Lighting Technology Center
- PlanetLab Consortium

Complete Information on our website.

Courses in Engineering: Electrical and Computer Engineering (EEC)

Lower Division Courses

1. Introduction to Electrical and Computer Engineering (1)
Lecture—1 hour. Overview of Electrical and Computer Engineering programs and advising; setting and attaining goals; ethics; introduction to major topics in ECE. (P/NP grading only.)—I. (I.)

70. Computer Structure and Assembly Language (4)
Lecture—3 hours; workshop—1 hour. Prerequisite: Computer Science Engineering 30. Computer architecture; machine language; assembly language; macros and conditional macros; subroutine/parameter passing; input-output programming, interrupt and trap; direct-memory-access; absolute and relocatable code; re-entrant code; program development in an operating system. Only one unit of credit to students who have completed Computer Science Engineering 50.—I, II. (I, II.) Akella, Al-Asaad, Chuah, Wilken

90C. Research Group Conference in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite: consent of instructor; lower division standing. Research group conferences. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

90X. Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite: consent of instructor. Examination of a special topic in a small group setting. May be repeated for credit.

92. Internship in Electrical and Computer Engineering (1-5)
Internship—3-15 hours. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work experience in Electrical and Computer Engineering. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5)
(P/NP grading only.)

Upper Division Courses

100. Circuits II (5)
Laboratory—3 hours; lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 17. Restricted to the following majors: Electrical Engineering, Computer Engineering, Computer Science & Engineering, Electronic Materials Engineering, Electrical Engineering/Materials Science, Optical Science & Engineering, Biomedical Engineering, Applied Physics, Electrical & Computer Engineering Graduate Students. Theory, application, and design of analog circuits. Methods of analysis including frequency response, SPICE simulation, and Laplace transform. Operational amplifiers and design of active filters. Students who have completed Engineering 100 may receive 3.5 units of credit.—I, II. (I, II.) Abdel-Ghaffar, Chang, Levy, Yankelevich

110A. Electronic Circuits I (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100; 140A. Use and modeling of nonlinear solid-state electronic devices in basic analog and digital circuits. Introduction to the design of transistor amplifiers and logic gates.—II, III. (II, III.) Amirtharajah, Hurst, Lewis, O'Driscoll, Spencer

110B. Electronic Circuits II (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110A. Analysis and design of integrated circuits. Single-stage amplifiers, cascaded amplifier stages, differential amplifiers, current sources, frequency response, and return-ratio analysis of feedback amplifiers.—III. (III.) Hurst, Lewis, O'Driscoll, Spencer

112. Communication Electronics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 110B and 150A. Electronic circuits for analog and digital communication, including oscillators, mixers, tuned amplifiers, modulators, demodulators, and phase-locked loops. Circuits for amplitude modulation (AM) and frequency modulation (FM) are emphasized.—II. (II.) Lewis

116. VLSI Design (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 110A and 180A. CMOS devices, layout, circuits, and functional units; VLSI fabrication and design methodologies.—I. (I.) Baas

118. Digital Integrated Circuits (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110A, 180A. Analysis and design of digital integrated circuits. Emphasis on MOS logic circuit families. Logic gate construction, voltage transfer characteristics, and propagation delay. Regenerative circuits, RAMs, ROMs, and PLAs.—III. (III.) Amirtharajah

130A. Electromagnetics I (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21D, Physics 9D, Engineering 17. Basics of static electric and magnetic fields and fields in materials. Work and scalar potential. Max-

well's equations in integral and differential form. Plan waves in lossless media. Lossless transmission lines.—I, II. (I, II.) Pham, Luhmann, Yankelevich

130B. Introductory Electromagnetics II (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A. Plane wave propagation in lossy media, reflections, guided waves, simple modulated waves and dispersion, and basic antennas.—III. (III.) Knoesen, Pham, Yoo

132A. RF and Microwaves in Wireless Communication (5)
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 110B, 130B, 140B. The study of Radio Frequency and Microwave theory and practice for design of wireless electronic systems. Transmission lines, microwave integrated circuits, circuit analysis of electromagnetic energy transfer systems, the scattering parameters.—I. (I.) Branner, Luhmann

132B. RF and Microwaves in Wireless Communication (5)
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 132A. Passive RF and microwave device analysis, design, fabrication, and testing for wireless applications. RF and microwave filter and coupler design. Introductory analysis and design of RF and microwave transistor amplifiers.—II. (II.) Branner, Luhmann

132C. RF and Microwaves in Wireless Communications (5)
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 132B. RF and microwave amplifier theory and design, including transistor circuit models, stability considerations, noise models and low noise design. Theory and design of microwave transistor oscillators and mixers. Wireless system design and analysis.—III. (III.) Branner, Luhmann

133. Electromagnetic Radiation and Antenna Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisites: course 130B. Properties of electromagnetic radiation; analysis and design of antennas: ideal cylindrical, small loop, aperture, and arrays; antenna field measurements.—I. (I.) Pham

135. Optical Communications I: Fibers (4)
Lecture—4 hours. Prerequisite: courses 130B, 140A, 150A. Principles of optical communication systems. Planar dielectric waveguides. Optical fibers: single-mode, multi-mode, step and graded index. Attenuation and dispersion in optical fibers. Optical sources, detectors, transmitters and receivers. Design of digital optical communication links.—II. (II.) Knoesen, Yoo

136A. Electronic Design Project (3)
Workshop—1 hours; laboratory—8 hours. Prerequisite: course 135 or 151 or 152 or 172, any may be taken concurrently. Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. (Deferred grading only, pending completion of sequence.)—II. (II.) Knoesen

136B. Electronic Design Project (2)
Workshop—1 hours; laboratory—5 hours. Prerequisite: course 136A. Optical, electronic and communication-engineering design of an opto-electronic system operating under performance and economic constraints. Measurement techniques will be designed and implemented, and the system will be characterized. (Deferred grading only, pending completion of sequence.)—III. (III.) Knoesen

140A. Principles of Device Physics I (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 17; Physics 9D. Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, electrons and holes, p-n and Schottky junctions, first-order metal-oxide-semiconductor (MOS) field effect transistors, bipolar junction transistor fundamentals.—I, II. (I, II.) Fink, Hunt, Islam, Kiehl, Yankelevich

140B. Principles of Device Physics II (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 140A. Electrical properties, designs, models and advanced concepts for MOS, Bipolar, and Junction Field-Effect Transistors, including scaling, minority-carrier distributions, non-ideal effects, and device fabrication methods. MESFET and heterojunction bipolar transistors (HBTs). Fundamentals of solar cells, photodetectors, LEDs and semiconductor lasers.—III. (III.) Hunt, Islam, Kiehl

146A. Integrated Circuits Fabrication (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 140B. Basic fabrication processes for Metal Oxide Semiconductor (MOS) integrated circuits. Laboratory assignments covering oxidation, photolithography, impurity diffusion, metallization, wet chemical etching, and characterization work together in producing metal-gate PMOS test chips which will undergo parametric and functional testing.—I. (I.) Hunt, Islam

146B. Advanced Integrated Circuits Fabrication (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 146A. Restricted to Electrical, Computer, and Electrical/Materials Science majors and Electrical Engineering graduate students. Non-majors accommodated when space available. Fabrication processes for CMOS VLSI. Laboratory projects examine deposition of thin films, ion implantation, process simulation, anisotropic plasma etching, sputter metallization, and C-V analysis. Topics include isolation, projection alignment, epilayer growth, thin gate oxidation, and rapid thermal annealing.—II. (II.)

150A. Introduction to Signals and Systems I (4)
Lecture—4 hours. Prerequisite: Engineering 6 (may be taken concurrently), course 100. Characterization and analysis of continuous-time linear systems. Fourier series and transforms with applications. Introduction to communication systems. Transfer functions and block diagrams. Elements of feedback systems. Stability of linear systems.—II. (II.) Abdel-Ghaffar, Ding, Levy, Zhao

150B. Introduction to Signals and Systems II (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Characterization and analysis of discrete time systems. Difference equation models. Z-transform analysis methods. Discrete and fast Fourier transforms. Introduction to digital filter design.—I. (I.) Abdel-Ghaffar, Levy, Zhao

151. Instrumentation Interfacing, Signals and Systems (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 100, 150A, 180A. Study of instrumentation interfacing systems, including software development, hardware interfacing, transducers, dynamic response, signal conditioning, A/D conversion, and data transmission.—II. (II.) Chang, Ford, Yankelevich

152. Digital Signal Processing (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 70 and 150B. Theory and practice of real-time digital signal processing. Fundamentals of real-time systems. Programmable architectures including I/O, memory, peripherals, interrupts, DMA. Interfacing issues with A/D and D/A converters to a programmable DSP. Specification driven design and implementation of simple DSP applications.—III. (III.) Ding

157A. Control Systems (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150A. Analysis and design of feedback control systems. Examples are drawn from electrical and mechanical systems as well as other engineering fields. Mathematical modeling of systems, stability criteria, root-locus and frequency domain design methods.—I. (I.) Chang, Gundes

157B. Control Systems (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 157A. Control system design; transfer-function and state-space methods; sampled-data implementation, digital control. Laboratory includes feedback system experiments and simulation studies.—II. (II.) Gundes

158. Control System Design Methods (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 157A. Design methods for feedback control systems, including quantitative feedback theory and linear quadratic regulators.—III. (III.) Chang

160. Signal Analysis and Communications (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Signal analysis based on Fourier methods. Fourier series and transforms; time-sampling, convolution, and filtering; spectral density; modulation: carrier-amplitude, carrier-frequency, and pulse-amplitude.—I. (I.) Ding

161. Probabilistic Analysis of Electrical & Computer Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisites: course 100. Probabilistic and statistical analysis of electrical and computer systems. Discrete and continuous random variables, expectation and moments. Transformation of random variables. Joint and conditional densities. Limit theorems and statistics. Noise models, system reliability and testing.—I, III. (I, III.) Abdel-Ghaffar, Ding, Levy, Scaglione, Zhao

165. Statistical and Digital Communication (4)
Lecture—3 hours; project—3 hours. Prerequisite: course 160, 161. Introduction to random process models of modulated signals and noise, and analysis of receiver performance. Analog and digitally modulated signals. Signal-to-noise ratio, probability of error, matched filters. Intersymbol interference, pulse shaping and equalization. Carrier and clock synchronization.—II. (II.) Abdel-Ghaffar, Ding, Ford, Levy

170. Introduction to Computer Architecture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 180A; course 70 or Computer Science Engineering 50. Introduction to basic aspects of computer architecture, including computer performance measurement, instruction set design, computer arithmetic, pipelined/non-pipelined implementation, and memory hierarchies (cache and virtual memory). Presents a simplified Reduced Instruction Set Computer using logic design methods from the prerequisite course. Not open for credit to students who have taken course 171.—I. (I.) Akella, Ghiasi, Owens, Wilken

171. Parallel Computer Architecture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 170. Organization and design of parallel processors including shared-memory multiprocessors, cache coherence, memory consistency, snooping protocols, synchronization, scalable multiprocessors, message passing protocols, distributed shared memory and interconnection networks.—III. (III.) Owens, Wilken

172. Microcomputer-Based System Design (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 170 or Computer Science Engineering 154B, course 180A; course 180B recommended. Microprocessor architecture and its software conventions. I/O interface design with emphasis on devices such as transceivers, A-D/D-A converters and timers. System design using polling, interrupts, and DMA as I/O techniques. Programming in both assembly and high-level languages.—II. (II.) Ghiasi, Owens, Wilken

173A. Computer Networks (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Computer Science Engineering 60; Mathematics 135A or Statistics 131A, or Statistics 120 or Statistics 32. Overview of local and wide-area computer networks. IS0 seven-layer model. Physical aspects of data transmission. Data-link layer protocols. Network architectures. Routing. TCP/IP protocol suite. Local area networks. Medium access protocols. Network performance analysis. Only two units of credit

for students who have taken Computer Science Engineering 157. (Same course as Computer Science Engineering 152A.)—I, III. (I, III.) Chuah

173B. Design Projects in Communication Networks (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 173A or Computer Science and Engineering 152A. Advanced topics and design projects in communication networks. Example topics include wireless networks, multimedia networking, network design and management, traffic analysis and modeling, network simulations and performance analysis. Offered in alternate years. (Same course as Computer Science and Engineering 152C.)—III. (III.) Chuah

180A. Digital Systems I (5)
Lecture—3 hours; laboratory—6 hours. Prerequisite: Physics 9C. Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems and algorithmic state machine design; computer aided design (CAD) methodologies and tools.—I, II. (I, II.) Akella, Al-Asaad, Amirtharajah, Baas, Ghiasi, Owens

180B. Digital Systems II (5)
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 110A; 180A. Computer-aided design of digital systems with emphasis on hardware description languages (VHDL), logic synthesis, and field-programmable gate arrays (FPGA). May cover advanced topics in digital system design such as static timing analysis, pipelining, memory system design, testing digital circuits.—II, III. (II, III.) Akella, Al-Asaad, Ghiasi

181A. Digital Systems Design Project (2)
Workshop—1 hour; laboratory—4 hours. Prerequisite: courses 180B and either course 170 or Computer Science 122A. Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. (Deferred grading only, pending completion of sequence.)—I. (I.) Ghiasi

181B. Digital Systems Design Project (2)
Workshop—1 hour; laboratory—4 hours. Prerequisite: courses 180B and either course 170 or Computer Science 122A. Digital-system and computer-engineering design course involving architecture, design, implementation and testing of a prototype application-specific processor under given design constraints. This is a team project that includes a final presentation and report. (Deferred grading only, pending completion of sequence.)—II. (II.) Ghiasi

183. Testing and Verification of Digital Systems (5)
Lecture—3 hours; laboratory—4 hours. Prerequisite: courses 170 and 180B. Computer aided testing and design verification techniques for digital systems; physical fault testing; simulation-based design verification; formal verification; timing analysis.—II. (II.) Al-Asaad

189A-V. Special Topics in Electrical Engineering and Computer Science (1-5)
Prerequisite: consent of instructor. Special Topics in (A) Computer Science; (B) Programming Systems; (C) Digital Systems; (D) Communications; (E) Signal Transmission; (F) Digital Communication; (G) Control Systems; (H) Robotics; (I) Signal Processing; (J) Image Processing; (K) High-Frequency Phenomena and Devices; (L) Solid-State Devices and Physical Electronics, (M) Systems Theory, (N) Active and Passive Circuits; (O) Integrated Circuits; (P) Computer Software; (Q) Computer Engineering; (R) Microprocessing; (S) Electronics; (T) Electromagnetics; (U) Opt-Electronics; (V) Computer Networks. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

190C. Research Group Conferences in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite: upper division standing in Electrical and Computer Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship in Electrical and Computer Engineering (1-5)
Internship—3-15 hours. Prerequisite: completion of a minimum of 84 units; project approval before period of internship; consent of instructor. Supervised work experience in electrical and computer engineering. May be repeated for credit if project is different. (P/NP grading only.)—I, II, III. (I, II, III.)

193A. Senior Design Project (2)
Project—6 hours. Prerequisite: senior standing in Electrical or Computer Engineering; course 196 (may be taken concurrently); consent of instructor. Team design project for seniors in Electrical or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project is supervised by a faculty member. (Deferred grading only, pending completion of sequence.)—I, II. (I, II.)

193B. Senior Design Project (2)
Project—1 hour; laboratory—6 hours. Prerequisite: course 193A. Team design project for seniors in Electrical Engineering or Computer Engineering. Project involves analysis, design, implementation and evaluation of an Electrical Engineering or Computer Engineering system. Project supervised by a faculty member. (Deferred grading only, pending completion of sequence.)—II, III. (II, III.)

194A. Micromouse Design Project (2)
Discussion—1 hour; laboratory—3 hours. Prerequisite: Course 70 or Computer Science Engineering 50; Engineering 17 and course 196 (may be taken concurrently); course 100 or Engineering 100 recommended (may be taken concurrently); course 180A recommended (may be taken concurrently). Design of robotic mouse for the IEEE Micromouse competition. May be repeated one time for credit. (Deferred grading only, pending completion of sequence.) Offered irregularly.

194B. Micromouse Design Project (2)
Discussion—1 hour; laboratory—3 hours. Prerequisite: course 70 or Computer Science Engineering 50, Engineering 17 (may be taken concurrently); course 100 or Engineering 100 recommended (may be taken concurrently), course 180A recommended (may be taken concurrently). Design of robotic mouse for the IEEE Micromouse competition. Limited enrollment. May be repeated one time for credit. (Deferred grading only, pending completion of sequence.) Offered irregularly.

194C. Micromouse Design Project (1)
Discussion—1 hour. Prerequisite: course 70 or Computer Science Engineering 50, Engineering 17 (may be taken concurrently); course 100 or Engineering 100 recommended (may be taken concurrently), course 180A recommended (may be taken concurrently). Design of robotic mouse for the IEEE Micromouse competition. Limited enrollment. May be repeated one time for credit. (Deferred grading only, pending completion of sequence.) Offered irregularly.

195A. NATCAR Design Project (3)
Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 110A, 110B or 157A (can be taken concurrently); 170 recommended (taken concurrently) if student intends to complete project with digital circuits. Design and construct an autonomous race car. Students work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. Limited enrollment. (Deferred grading only pending completion of sequence.)—I. (I.) Spencer

195B. NATCAR Design Project (2)
Workshop—1 hours; laboratory—4 hours. Prerequisite: course 195A. Design and construct an autonomous race car. Students work in groups to design, build and test speed control circuits, track sensing circuits, and a steering control loop. (Deferred grading only pending completion of sequence.)—II. (II.) Spencer

196. Issues in Engineering Design (1)
Seminar—1 hour. Prerequisite: senior standing in Electrical or Computer Engineering. The course covers various electrical and computer engineering standards and realistic design constraints including economic, manufacturability, sustainability, ethical, health and safety, environmental, social, and political.—I. (I.)

197T. Tutoring in Electrical and Computer Engineering (1-3)
Discussion—1 hour; discussion/laboratory—2-8 hours. Prerequisite: upper division standing; consent of instructor. Tutoring in Electrical and Computer Engineering courses, especially introductory circuits. For upper-division undergraduate students who will provide tutorial assistance. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. May be repeated three times for credit. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201. Digital Signal Processing (4)
Lecture—4 hours. Prerequisite: course 150B; Statistics 120 or Mathematics 131 or Mathematics 167 recommended. Theory and design of digital filters. Classification of digital filters, linear phase systems, all-pass functions, FIR and IIR filter design methods and optimality measures, numerically robust structures for digital filters.—II. (II.)

202. Advanced Digital Signal Processing (4)
Lecture—4 hours. Prerequisite: courses 201, 260, and 265, and Mathematics 167 are recommended. Multirate DSP theory and wavelets, optimal transform and subband coders in data compressions, advanced sampling theory and oversampled A/D converters, transmultiplexers and precoders in digital communication systems, genomic signal processing. Offered in alternate years.—(III.)

206. Digital Image Processing (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 150B. Two-dimensional systems theory, image perception, sampling and quantization, transform theory and applications, enhancement, filtering and restoration, image analysis, and image processing systems.—(II.)

210. MOS Analog Circuit Design (3)
Lecture—3 hours. Prerequisite: courses 110B, 111B and 140B. Analysis and design of MOS amplifiers, bias circuits, voltage references and other analog circuits. Stability and compensation of feedback amplifiers. Introduction to noise analysis in MOS circuits.—I. (I.)

211. Advanced Analog Circuit Design (3)
Lecture—3 hours. Prerequisite: course 210; Statistics 131A and course 112 recommended. Noise and distortion in electronic circuits and systems. Application to communication circuits. Specific applications include mixers, low-noise amplifiers, power amplifiers, phase-locked loops, oscillators and receiver architectures.—II. (II.)

212. Analog MOS IC Design for Signal Processing (3)
Lecture—3 hours. Prerequisite: course 210. Analysis and design of analog MOS integrated circuits. Passive components, single-ended and fully differential op amps, sampled-data and continuous-time filters.—II. (II.)

213. Data-Conversion Techniques and Circuits (3)
Lecture—3 hours. Prerequisite: course 210. Digital-to-analog and analog-to-digital conversion; component characteristics and matching; sample-and-hold, comparator, amplifier, and reference circuits.—III. (III.)

214. Computer-Aided Circuit Analysis and Design (3)
Lecture—3 hours. Prerequisite: courses 110A, 110B and knowledge of FORTRAN or C. Network equation formulations. Nonlinear DC, linear AC, time-domain (both linear and nonlinear), steady-state (nonlinear) and harmonic analysis. DC, AC, and time-domain sensitivities of linear and nonlinear circuits. Gradient-based design optimization. Behavioral simulations. Extensive CAD project.—II. (II.)

215. Circuits for Digital Communications (3)
Lecture—3 hours. Prerequisite: courses 150B and 210 (may be taken concurrently); course 165, 166 or 265 recommended. Analog, digital, and mixed-signal CMOS implementations of communication-circuit blocks; gain control, adaptive equalizers, sampling detectors, clock recovery. Offered in alternate years.—III.

216. Low Power Digital Integrated Circuit Design (3)
Lecture—3 hours. Prerequisite: course 118. IC design for low power and energy consumption. Low power architectures, logic styles and circuit design. Variable supply and threshold voltages. Leakage management. Power estimation. Energy sources, power electronics, and energy recovery. Applications in portable electronics and sensors. Thermodynamic limits.—II. (II.)

219. Advanced Digital Circuit Design (3)
Lecture—3 hours. Prerequisite: course 118 or 218A. Analysis and design of digital circuits. Both bipolar and MOS circuits are covered. Dynamic and static RAM cells and sense amplifiers. Advanced MOS families. Multi-valued logic.—(III.)

221. Analog Filter Design (3)
Lecture—3 hours. Prerequisite: courses 100 and 150A. Design of active and passive filters including filter specification and approximation theory. Passive LC filter design will cover doubly-terminated reactance two-port synthesis. Active filter design will include sensitivity, op-amp building blocks, cascade, multi-loop, ladder and active-R filter design. Offered in alternate years.—(I.)

222. RF IC Design (3)
Lecture—3 hours. Prerequisite: course 132C and 210. Radio frequency (RF) solid-state devices, RF device modeling and design rules; non-linear RF circuit design techniques; use of non-linear computer-aided (CAD) tools; RF power amplifier design.—III. (III.)

228. Advanced Microwave Circuit and Device Design Techniques (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132B. Theory, design, fabrication, analysis of advanced microwave circuits and devices. Wideband transformers, stripline/microstripline broadband couplers. Lumped and distributed filter synthesis. Broadband matching theory applied to microwave devices. Wideband and low noise FET/HEMT amplifiers. Advanced microwave oscillator theory. Phase noise analysis. Offered in alternate years.—III.

230. Electromagnetics (3)
Lecture—3 hours. Prerequisite: course 130B. Maxwell's equations, plane waves, reflection and refraction, complex waves, waveguides, resonant cavities, and basic antennas.—I. (I.)

232A. Advanced Applied Electromagnetics I (3)
Lecture—3 hours. Prerequisite: course 132B. The exact formulation of applied electromagnetic problems using Green's functions. Applications of these techniques to transmission circuits. Offered in alternate years.—II.

232B. Advanced Applied Electromagnetics II (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132B. Advanced treatment of electromagnetics with applications to passive microwave devices and antennas. Offered in alternate years.—(III.)

233. High Speed Signal Integrity (3)
Lecture—3 hours. Prerequisite: course 130B. Design and analysis of interconnects in high-speed circuits and sub-systems; understanding of high-speed signal propagation and signal integrity concepts; electromagnetic modeling tools and experimental techniques. Offered in alternate years.—III. Pham

235. Photonics (4)
Lecture—3 hours; project—1 hour. Prerequisite: course 230 (may be taken concurrently). Optical propagation of electromagnetic waves and beams in photonic components and the design of such devices using numerical techniques. Offered in alternate years.—II.

236. Nonlinear Optical Applications (3)
Lecture—3 hours. Prerequisite: course 130B, course 230 (may be taken concurrently). Nonlinear optical interactions in optical communication, optical information processing and integrated optics. Basic concepts underlying optical nonlinear interactions in materials and guided media. Not open for credit to students who have completed course 233. Offered in alternate years.—(I.)

237A. Lasers (3)
Lecture—3 hours. Prerequisite: course 130B or the equivalent and course 235. Theoretical and practical description of lasers. Theory of population inversion, amplification and oscillation using semiclassical oscillator model and rate equations. Description and design of real laser system (Not open for credit to students who have completed course 226A.) Offered in alternate years.—(I.)

237B. Advanced Lasers (3)
Lecture—3 hours. Prerequisite: course 237A. Quantum mechanical description of lasers and interactions of materials with laser light. Relationship to rate equation approach. Optical Bloch equations and coherent effects. Theory and practice of active and passive mode-locking of lasers. Injection locking. Not open for credit to students who have completed course 226B. Offered in alternate years.—(II.)

238. Semiconductor Diode Lasers (3)
Lecture—3 hours. Prerequisite: course 245A. Understanding of fundamental optical transitions in semiconductor and quantum-confined systems are applied to diode lasers and selected photonic devices. The importance of radiative and non-radiative recombination, simulated emission, excitons in quantum wells, and strained quantum layers are considered. Offered in alternate years.—III.

239A. Optical Fiber Communications Technologies (4)
Lecture—4 hours. Prerequisite: course 130B. Physical layer issues for component and system technologies in optical fiber networks. Sources of physical layer impairments and limitations in network scalability. Enabling technologies for wavelength-division-multiplexing and time-division-multiplexing networks. Optical amplifiers and their impact in optical networks (signal-to-noise ratio, gain-equalization, and cascadability).—I. (I.)

239B. Optical Fiber Communications Systems and Networking (4)
Lecture—4 hours. Prerequisite: course 239A. Physical layer optical communications systems in network architectures and protocols. Optical systems design and integration using optical component technologies. Comparison of wavelength routed WDM, TDM, and NGI systems and networks. Case studies of next generation technologies. Offered in alternate years.—(II.)

240. Semiconductor Device Physics (3)
Lecture—3 hours. Prerequisite: course 140B. Physical principles, characteristics and models of fundamental semiconductor device types, including P-N and Schottky diodes, MOSFETs and MESFETs Bipolar Junction Transistors, and light emitters/detectors.—I. (I.)

242. Advanced Nanostructured Devices (3)
Lecture—3 hours. Prerequisite: courses 130A and 140A. Physics of nano-structured materials and device operation. Overview of new devices enabled by nanotechnology; fabrication and characterization methods; applications of nano-structures and devices. Offered in alternate years.—(I.)

243. Silicon-on-Insulator (SOI) Technology (3)
Lecture—3 hours. Prerequisite: course 140B or 240 recommended. SOI (Silicon-on-Insulator) technology from all major points of view: materials fabrication, processing technology, device physics, and circuit basics. Offered in alternate years.—(III.)

244A. Design of Microelectromechanical Systems (MEMS) (3)
Lecture—3 hours. Prerequisite: course 140A, 140B or consent of instructor. Theory and practice of MEMS design. Micromechanical fundamentals, CAD tools, and case studies. A MEMS design project is required. The designs will be fabricated in a commercial foundry and tested in course 244B. Offered in alternate years.—(I.)

244B. Design of Microelectromechanical Systems (MEMS) (1)
Laboratory—3 hours. Prerequisite: course 244A. Testing of surface micromachined MEMS devices including post-processing, design of test fixtures and test methodology, measurements, and data analysis. (S/U grading only.) Offered in alternate years.—(III.)

246. Advanced Projects in IC Fabrication (3)
Discussion—1 hour; laboratory—6 hours. Prerequisite: course 146B. Individualized projects in the fabrication of analog or digital integrated circuits. Offered in alternate years.—II.

247. Advanced Semiconductor Devices (3)
Lecture—3 hours. Prerequisite: course 240. Physics of various semiconductor devices, including metal-oxide-semiconductor field-effect transistors (MOSFETs), IMPATT and related transit-time diodes, transferred-electron devices, light-emitting diodes, semiconductor lasers, photodetectors, and solar cells. Offered in alternate years.—(II.)

249. Microfabrication (3)
Lecture—3 hours. Prerequisite: course 140B. Theory and practices of several major technologies of microfabrication, used for producing integrated circuits, sensors, and microstructures. Major topics include sputtering, chemical vapor deposition, plasma processing, micromachining, and ion implantation. Offered in alternate years.—III.

250. Linear Systems and Signals (4)
Lecture—4 hours. Prerequisite: course 150A. Mathematical description of systems. Selected topics in linear algebra. Solution of the state equations and an analysis of stability, controllability, observability, realizations, state feedback and state estimation. Discrete-time signals and systems, and the Z-transform.—I. (I.)

251. Nonlinear Systems (3)
Lecture—3 hours. Prerequisite: course 250. Nonlinear differential equations, second-order systems, approximation methods, Lyapunov stability, absolute stability, Popov criterion, circle criterion, feedback linearization techniques. Offered in alternate years.—(III.)

252. Multivariable Control System Design (3)
Lecture—3 hours. Prerequisite: course 250. Modern control system design, theory, and techniques. Topics will include single-loop feedback design; stability, performance and robustness of multivariable control systems; LQG design; H-infinity design; frequency response methods; and optimization-based design. Offered in alternate years.—(II.)

254. Optimization (3)
Lecture—3 hours. Prerequisite: Mathematics 22A, knowledge of FORTRAN or C. Modeling optimization problems in engineering design and other applications; optimality conditions; unconstrained optimization (gradient, Newton, conjugate gradient and quasi-Newton methods); duality and Lagrangian relaxation constrained optimization. (Primal method and an introduction to penalty and augmented Lagrangian methods.) Offered in alternate years.—II.

255. Robotic Systems (3)
Lecture—3 hours. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and path planning. Dynamics of manipulators. Robot motion programming and control algorithm design. Offered in alternate years.—(II.)

260. Random Signals and Noise (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 120, course 150A; course 250 recommended. Random processes as probabilistic models for signals and noise. Review of probability, random variables, and expectation. Study of correlation function and spectral density, ergodicity and duality between time averages and expected values, filters and dynamical systems. Applications.—II. (II.)

261. Signal Processing for Communications (4)
Lecture—4 hours. Prerequisite: course 165, 260 or consent of instructor. Signal processing in wireless and wireline communication systems. Characterization and distortion of wireless and wireline channels. Channel equalization and maximum likelihood sequence estimation. Channel precoding and pre-equalization. OFDM and transmit diversity. Array processing. Offered in alternate years.—III.

262. Multi-Access Communications Theory (4)
Lecture—3 hours; project. Prerequisite: Statistics 120 or equivalent; course 173A or Engineering Computer Science 152A. Maximum stable throughput of Poisson collision channels. Classic collision resolution algorithms. Carrier sensing multiple access and its performance analysis. System stability analysis. Joint design of the physical/medium access control layers. Capacity region of multi-access channels. Multi-access with correlated sources. Offered in alternate years.—(III.)

263. Optimal and Adaptive Filtering (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 260. Geometric formulation of least-squares estimation problems. Theory and applications of optimum Wiener and Kalman filtering. MAP and maximum likelihood estimation of hidden Markov models, Viterbi algorithm. Adaptive filtering algorithms, properties and applications. Offered in alternate years.—(III.)

264. Estimation and Detection of Signals in Noise (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 260. Introduction to parameter estimation and detections of signals in noise. Bayes and Neyman-Pearson likelihood-ratio tests for signal detection. Maximum-likelihood parameter estimation. Detection of known and Gaussian signals in white or colored noise. Applications to communications, radar, signal processing.—III. (III.)

265. Principles of Digital Communications (4)
Lecture—4 hours. Prerequisite: courses 165 and 260, or consent of instructor. Introduction to digital communications. Coding for analog sources. Characterization of signals and systems. Modulation and demodulation for the additive Gaussian channel. Digital signaling over bandwidth-constrained linear filter channels and over fading multipath channels. Spread spectrum signals.—II. (II.)

266. Information Theory and Coding (3)
Lecture—3 hours. Prerequisite: Statistics 120. Information theory and coding. Measure of information. Redundancy reduction encoding of an information source. Capacity of a communication channel, error-free communications. Offered in alternate years.—II.

269A. Error Correcting Codes I (3)
Lecture—3 hours. Prerequisite: Mathematics 22A and course 160. Introduction to the theory and practice of block codes, linear block codes, cyclic codes, decoding algorithms, coding techniques.—I. (I.)

269B. Error Correcting Codes II (3)
Lecture—3 hours. Prerequisite: course 165 and 269A. Introduction to convolutional codes, turbo codes, trellis and block coded modulation codes, soft-decision decoding algorithms, the Viterbi algorithm, reliability-based decoding, trellis-based decoding, multistage decoding. Offered in alternate years.—(II.)

270. Computer Architecture (3)
Lecture—3 hours. Prerequisite: course 170 or Computer Science Engineering 154B. Introduction to modern techniques for high-performance single and multiple processor systems. Topics include advanced pipeline design, advanced memory hierarchy design, optimizing pipeline and memory use, and memory sharing among multiprocessors. Case studies of recent single and multiple processor systems.—II. (II.)

272. High-Performance Computer Architecture and Implementation (3)
Lecture—3 hours. Prerequisite: course 170 or Computer Science Engineering 154A, 154B and course 270 or Computer Science Engineering 250A. Architectural issues in achieving high-performance via concurrent execution of instructions and associated problems and limitations. Specialized architectures. Offered in alternate years.—150A. Mechanical Design III. (III.)

273. Networking Architecture and Resource Management (4)
Lecture—3 hours; project—1 hour. Prerequisite: Computer Science Engineering 152A or course 173A; Computer Science Engineering 252 recommended. Design and implementation principles of networking architecture and protocols. Internet, ATM, and telephony case studies. Topics: Internet technology; application and services; resource management; Quality of Service (QoS) provisioning; traffic engineering; performance evaluation and future research issues. (Same course as Computer Science Engineering 258.)—II. (II.) Chuah, Mohapatra

274. Internet Measurements, Modeling and Analysis (4)
Lecture—3 hours; project. Prerequisite: Computer Science Engineering 252 or course 273. Advanced topics in the theoretical foundations of network measurements, modeling, and statistical inferencing. Applications to Internet engineering, routing optimization, load balancing, traffic engineering, fault tolerance, anomaly detection, and network security. Individual project requirement. Offered in alternate years.—(III.)

276. Fault-Tolerant Computer Systems: Design and Analysis (3)
Lecture—3 hours. Prerequisite: courses 170, 180A. Introduces fault-tolerant digital system theory and practice. Covers recent and classic fault-tolerant techniques based on hardware redundancy, time redundancy, information redundancy, and software redundancy. Examines hardware and software reliability analysis, and example fault-tolerant designs. Not open for credit to students who have completed course 276A. Offered in alternate years.—II.

277. Graphics Architecture (3)
Lecture—3 hours. Prerequisite: Computer Science Engineering 154B or course 170, Computer Science Engineering 175. Design and analysis of the architecture of computer graphics systems. Topics include the graphics pipeline with a concentration on hardware techniques and algorithms, exploiting parallelism in graphics, and case studies of noteworthy and modern graphics architectures. Offered in alternate years.—II.

278. Computer Arithmetic for Digital Implementation (3)
Lecture—3 hours. Prerequisite: courses 170, 180A. The design and implementation of computer arithmetic logic units are studied with particular emphasis on high-speed performance requirements. Addition (subtraction), multiplication and division operations are covered, and fixed and floating-point representations are examined. Offered in alternate years.—III.

281. VLSI Digital Signal Processing (3)
Lecture—3 hours. Prerequisite: courses 150B, 170, 180B or consent of instructor. Digital signal processors, building blocks, and algorithms. Design and implementation of processor algorithms, architectures, control, functional units, and circuit topologies for increased performance and reduced circuit size and power dissipation.—II. (II.)

282. Hardware Software Codesign (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 170, 180B. Specification and design of embedded systems; modeling and performance estimation; hardware/software partitioning; co-simulation; design re-use; platform-based design; reconfigurable computing.—III.

283. Advanced Design Verification of Digital Systems (4)
Lecture—3 hours; project. Prerequisite: courses 170 and 180A. Design verification techniques for digital systems; simulation-based design verification techniques; formal verification techniques, including equivalence checking, model checking, and theorem proving; timing analysis and verification; application of design certification techniques to microprocessors. Offered in alternate years.—II.

284. Design and Optimization of Embedded Computing Systems (4)
Lecture—4 hours. Prerequisite: courses 170 and 180B, or consent of instructor. Computer Science Engineering 122A recommended. Introduction to design and optimization of digital computing systems for embedded applications. Topics include combinatorial optimization techniques, performance and energy optimization in embedded systems, compilation and architecture-specific mapping, programmable and reconfigurable platforms; design automation and algorithmic improvements to design process.—II. (II.)

286. Introduction to Digital System Testing (3)
Lecture—3 hours. Prerequisite: course 180A; Statistics 120 or 131A. A review of several current techniques used to diagnose faults in both combinational and sequential circuits. Topics include path sensitization procedures, Boolean difference, D-algorithm random test generation, TC testing and an analysis of the effects of intermittent faults. Not open for credit to students who have completed course 276A. Offered in alternate years.—II.

289A-V. Special Topics in Electrical and Computer Engineering (1-5)
Lecture/laboratory—1-5 units. Prerequisite: consent of instructor. Special topics in (A) Computer Science, (B) Programming Systems, (C) Digital Systems (D) Communications, (E) Signal Transmission, (F) Digital Communication, (G) Control Systems, (H) Robotics, (I) Signal Processing, (J) Image Processing, (K) High Frequency Phenomena and Devices, (L) Solid-State Devices and Physical Electronics, (M) Systems Theory, (N) Active and Passive Circuits, (O) Integrated Circuits, (P) Computer Software, (Q) Computer Engineering, (R) Microprocessing, (S) Electronics, (T) Electromagnetics, (U) Optoelectronics, (V) Computer Networks. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

290. Seminar in Electrical and Computer Engineering (1)
Seminar—1 hour. Discussion and presentation of current research and development in Electrical and Computer Engineering. May be repeated for credit. (S/U grading only.)—I, II. (I, II.)

290C. Graduate Research Group Conference in Electrical and Computer Engineering (1)
Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in electrical and computer engineering. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

291. Solid-State Circuit Research Laboratory Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state circuit and system design by various visiting experts in the field. May be repeated for credit. (S/U grading only.)—III. (III.)

292. Seminar in Solid-State Technology (1)
Seminar—1 hour. Prerequisite: graduate standing. Lectures on solid-state technology by various visiting experts in the field. May be repeated for credit. (S/U grading only.)—III. (III.)

293. Computer Engineering Research Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Lectures, tutorials, and seminars on topics in computer engineering. May be repeated for credit up to four times. (S/U grading only.)—II, III. (II, III.)

294. Communications, Signal and Image Processing Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing. Communications, signal and image processing, video engineering and computer vision. May be repeated for credit. (S/U grading only.)—I, II, III.

295. Systems, Control and Robotics Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing. Seminars on current research in systems and control by faculty and visiting experts. Technical presentations and lectures on current topics in robotics research and robotics technology. May be repeated for credit. (S/U grading only.)—II. (II.)

296. Photonics Research Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing. Lectures on photonics and related areas by faculty and visiting experts. May be repeated for credit. (S/U grading only.)—II, III. (II, III.)

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Courses

390. The Teaching of Electrical Engineering (1)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Electrical Engineering. Participation as a teaching assistant or associate-in in a designated engineering course. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.)—I. (I.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Engineering: Mechanical and Aerospace Engineering

(College of Engineering)

C. P. (Case) van Dam, Ph.D., Chairperson of the Department

Fidelis O. Eke, Ph.D., Vice Chairperson of the Department

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

Faculty

Ralph C. Aldredge, III, Ph.D., Professor
Abdul I. Barakat, Ph.D., Professor
Jean-Jacques Chattot, Ph.D., Professor
Harry H. Cheng, Ph.D., Professor
Cristina E. Davis, Ph.D., Assistant Professor
Roger Davis, Ph.D., Professor
Jean-Pierre Delplanque, Ph.D., Professor
Raissa D'Souza, Ph.D., Associate Professor
Paul A. Erickson, Ph.D., Associate Professor
Fidelis O. Eke, Ph.D., Professor
Rida T. Farouki, Ph.D., Professor
Andrew A. Frank, Ph.D., Professor
Mohamed M. Hafez, Ph.D., Professor,
Academic Senate Distinguished Teaching Award
Ronald A. Hess, Ph.D., Professor
Michael R. Hill, Ph.D., Professor
David A. Horsley, Ph.D., Associate Professor
Mont Hubbard, Ph.D., Professor
Maury L. Hull, Ph.D., Professor
Sanjay S. Joshi, Ph.D., Associate Professor
Dean C. Karnopp, Ph.D., Professor
Ian M. Kennedy, Ph.D., Professor
Valeria La Saponara, Ph.D., Assistant Professor
Donald L. Margolis, Ph.D., Professor
Jae Wan Park, Ph.D., Assistant Professor
Bahram Ravani, Ph.D., Professor
Nesrin Sarigul-Klijn, Ph.D., Professor
Benjamin D. Shaw, Ph.D., Professor
C. P. (Case) van Dam, Ph.D., Professor
Steven A. Velinsky, Ph.D., Professor
Anthony S. Wexler, Ph.D., Professor
Bruce R. White, Ph.D., Professor
Kazuo Yamazaki, Ph.D., Professor

Emeriti Faculty

Charles W. Beadle, Ph.D., Professor Emeritus
James W. Baughn, Ph.D., Professor Emeritus,
Academic Senate Distinguished Teaching Award
Harry A. Dwyer, Ph.D., Professor Emeritus
Wolfgang Kollmann, Dr-Ing, Professor Emeritus
Jerald M. Henderson, D.Engr., Professor Emeritus
Myron A. Hoffman, Sc.D., Professor Emeritus
John D. Kemper, Ph.D., Professor Emeritus
Lawrence W. Rehfield, Ph.D. Professor Emeritus
Allan A. McKillop, Ph.D., Professor Emeritus

Affiliated Faculty

James Schaaf, Ph.D., Lecturer

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

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

The Mechanical Engineering Programs are described after the Aerospace Science and Engineering Program description. The Mechanical and Aeronautical Engineering Graduate Program is described after all the undergraduate program descriptions.

Division of Aerospace Science and Engineering

The Division of Aerospace Science and Engineering administers both the Aeronautical Science and Engineering Program (no longer open for admittance or transfer) and the Aerospace Science and Engineering Program within the Department of Mechanical and Aerospace Engineering. The curricula for both programs are identical.

As of Fall 2009, all students transferring into our aero program will be placed into the Aerospace Science and Engineering Program. All new students will be admitted into the Aerospace Science and Engineering Program. This program is not yet accredited by the Engineering Accreditation Commission of Accreditation Board for Engineering and Technology (ABET).

All students currently in the Aeronautical Science and Engineering program can remain in it; this program is accredited by the Engineering Accreditation Commission of ABET

Faculty

Jean-Jacques Chattot, Ph.D., Professor
Roger Davis, Ph.D., Professor
Jean-Pierre Delplanque, Ph.D., Professor
Fidelis O. Eke, Ph.D., Professor
Mohamed M. Hafez, Ph.D., Professor
Academic Senate Distinguished Teaching Award
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Valeria La Saponara, Ph.D., Assistant Professor
Nesrin Sarigul-Klijn, Ph.D., Professor
C. P. (Case) van Dam, Ph.D., Professor
Bruce R. White, Ph.D., Professor

The Aerospace Science & Engineering Undergraduate Program

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

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

Aerospace Science and Engineering Undergraduate Major

The Aerospace Science and Engineering program is not accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C-9D	19
Chemistry 2A-2B or 2AH-2BH	10
Engineering 4	3
Engineering 6 or Mechanical Engineering 5	4
Engineering 17, 35, 45	11
English 3 or University Writing Program 1, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
Communication 1 or 3	4
General Education electives	16
Minimum Lower Division Units	**93**

Upper Division Requirements:

A broad range of technical elective courses is available. Some students choose these electives from one area of study in order to begin developing a specialty. Others choose from several areas in order to broaden their background in the sciences and engineering. Typical aerospace science and engineering specialties include aero-thermodynamics, propulsion systems, aircraft performance, stability and control, aerospace structures and vehicles, aeroelasticity, flight testing, component and mechanism design, or space systems design. There are a number of electives that could be recommended to all aerospace science and engineering students regardless of their chosen area of specialization.

Suggested technical electives:

Aerospace Science and Engineering 139, 141

Suggested Advisers: J.J. Chattot, M. Hafez, R.A. Hess, S. Joshi, V. La Saponara, N. Sarigul-Klijn, C.P. van Dam, B.R. White

Upper Division Required Courses

Engineering 100, 102, 103, 104, 105 19
Mechanical Engineering 106, 107A, 107B, 165, 171, 172 22
Aeronautical Science and Engineering 126, 127, 129, 130A, 130B, 133, 135, 138 32
Select one course from Applied Science Engineering 115, Engineering 180 or Mathematics 128C 4
Engineering 190 3
Technical electives 7
A combined maximum of four units may be selected from project/independent study courses (185A, 185B, 192, 199)
General Education electives 8
Minimum Upper Division Units 95

Minimum Units Required for Major 188

Aeronautical Science and Engineering Undergraduate Major

The Aeronautical Science and Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

This program is no longer open for admission or transfer. Students previously admitted to this program who complete all degree requirements will receive a degree in Aeronautical Science and Engineering.

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

Lower Division Required Courses

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C-9D	19
Chemistry 2A-2B or 2AH-2BH	10
Engineering 4	3
Engineering 6 or Mechanical Engineering 5	4
Engineering 17, 35, 45	11
English 3 or University Writing Program 1, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
Communication 1 or 3	4
General Education electives	16
Minimum Lower Division Units 93	

Upper Division Requirements:

A broad range of technical elective courses is available. Some students choose these electives from one area of study in order to begin developing a specialty. Others choose from several areas in order to broaden their background in the sciences and engineering. Typical aerospace science and engineering specialties include aero-thermodynamics, propulsion systems, aircraft performance, stability and control, aerospace structures and vehicles, aeroelasticity, flight testing, component and mechanism design, or space systems design. There are a number of electives that could be recommended to all aerospace science and engineering students regardless of their chosen area of specialization.

Suggested technical electives:

Aerospace Science and Engineering 139, 141

Suggested Advisers: J.J. Chattot, M. Hafez, R.A. Hess, S. Joshi, V. La Saponara, N. Sarigul-Klijn, C.P. van Dam, B.R. White

Upper Division Required Courses

Engineering 100, 102, 103, 104, 105 19
Mechanical Engineering 106, 107A, 107B, 165, 171, 172 22
Aeronautical Science and Engineering 126, 127, 129, 130A, 130B, 133, 135, 138 32
Select one course from Applied Science Engineering 115, Engineering 180 or Mathematics 128C 4
Engineering 190 3
Technical electives 7
A combined maximum of four units may be selected from project/independent study courses (185A, 185B, 192, 199)
General Education electives 8
Minimum Upper Division Units 95

Minimum Units Required for Major 188

The Mechanical Engineering Undergraduate Program

The mechanical engineer uses basic science in the design and manufacture of complex engineering systems, requiring the application of physical and mechanical principles to the development of machines, energy conversion systems, materials, and equipment for guidance and control.

Work in this broad field of engineering requires a thorough knowledge of mathematics, physics, chemistry, material science, fluid mechanics, thermodynamics, heat transfer, mass transfer, electricity, manufacturing processes, and economics.

The Mechanical Engineering Program is designed to provide knowledge in mechanical engineering and associated applied sciences so that graduates may practice in a broad range of industries, pursue graduate studies, participate in research and development, and/or pursue entrepreneurial endeavors.

Mechanical Engineering Undergraduate Program

The Mechanical Engineering program is accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Mechanical Engineering Programs Lower Division Requirements:

The lower division requirements for the Mechanical Engineering and Mechanical Engineering/Materials Science programs are the same.

Lower Division Required Courses

Requirements for the Mechanical Engineering and Mechanical Engineering/Materials Science and Engineering programs.

	UNITS
Mathematics 21A-21B-21C-21D	16
Mathematics 22A-22B	6
Physics 9A-9B-9C-9D	19
Chemistry 2A-2B or 2AH-2BH	10
Engineering 4	3
Engineering 6 or Mechanical Engineering 5	4
Engineering 17, 35, 45	11
Mechanical Engineering 50	4
English 3 or University Writing Program 1, or Comparative Literature 1, 2, 3, or 4, or Native American Studies 5	4
Communication 1 or 3	4
General Education electives	16
Minimum Lower Division Units 97	

Mechanical Engineering Upper Division Requirements:

Students spend their third year in further study of fundamental courses, and in the fourth year they may tailor their studies to their interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, mechanical design or thermodynamics. Students can either prepare for graduate study in Mechanical Engineering or obtain a broad background for entering engineering practice.

Students are encouraged to select elective courses from among the areas of specialization listed below.

Areas of Specialization

Mechanical Design. The creation and improvement of products, processes, or systems that are mechanical in nature are the primary activities of a professional mechanical engineer. The development of a product from concept generation to detailed design, manufacturing process selection and planning, quality control and assurance, and life cycle considerations are areas of study and specialization in the area of mechanical design.

Solutions to such major social problems as environmental pollution, the lack of mass transportation, the lack of raw materials, and energy shortages, will depend heavily on the engineer's ability to create new types of machinery and mechanical systems.

The engineer-designer must have a solid and relatively broad background in the basic physical and engineering sciences and have the ability to synthesize the information from such a background in creative problem solving. In addition to having technical competence, the designer must be able to consider the socioeconomic consequences of a design and its possible impact on the environment. Product safety, reliability, and economics are other considerations.

Suggested technical electives:

Aerospace Science and Engineering 130A, 130B, 133, 139
Biological Systems Engineering 114, 165
Applied Science Engineering 115
Engineering 111, 121, 122, 160 (only one unit of credit towards Technical Electives requirement)
Materials Science and Engineering 180, 181, 182
Mechanical Engineering 121, 134, 150B, 151, 152, 161

Suggested Advisers: H.H. Cheng, R.T. Farouki, A.A. Frank, M.R. Hill, M.L. Hull, B. Ravani, S. Velinsky, K. Yamazaki

Biomedical and Engineering Fluid Mechanics. This field of study is based on the fundamentals of fluid mechanics and their broad range of applications in the biomedical and engineering areas. Areas of current research include blood circulation and its potential role in the regulation of normal physiological function and in the development of disease; groundwater and atmospheric flows and their implications for pollutant transport and environmental concerns; aerodynamic flow around transportation vehicles and its impact on vehicle performance; and flow in combustion engines and other energy systems with considerations of efficiency and environmental impact. These areas are investigated both experimentally and computationally.

Suggested technical electives:

Aerospace Science and Engineering 138
Engineering 121, 160 (only one unit of credit towards technical requirements); Engineering 180
Chemical Engineering 161A, 161B
Civil and Environmental Engineering 144, 149
Mechanical Engineering 161, 163

Suggested Advisers: R.C. Aldredge, A.I. Barakat, J.J. Chattot, M. Hafez, I.M. Kennedy, W. Kollmann, B.D. Shaw, C.P. van Dam, A.S. Wexler, B.R. White

Combustion and the Environment. Combustion is widely used for energy generation, propulsion, heating, and waste disposal, as well as for many other applications. Mechanical engineers are often heavily involved with the design of combustion systems (internal combustion engines, gas turbines, furnaces, etc.) and deal with aspects of combustion ranging from increasing efficiencies to reducing pollutant emissions. This specialization is for those who would like to work in fields that use combustion, or

that deal with pollution related to combustion. With the current increased emphasis on reducing pollutants while maintaining or increasing efficiency, the efforts of mechanical engineers in designing and improving combustion systems are becoming more important.

Suggested technical electives:

Mechanical Engineering 161, 163
Civil and Environmental Engineering 149, 150

Suggested Advisers: R.C. Aldredge, P. A. Erickson, I.M. Kennedy, W. Kollmann, B.D. Shaw

Heat Transfer, Thermodynamics, and Energy Systems. This specialization emphasizes the fundamentals of heat transfer and thermodynamics, and their application to the design of advanced engineering systems. The objective of the program is to introduce students to the fundamental processes of heat transfer and thermodynamics in complex engineering systems so that they are able to design more efficient, cost effective, and reliable systems with less environmental pollution and impact. An understanding of heat transfer and thermodynamics is required for the design of efficient, cost effective systems for power generation, propulsion, heat exchangers, industrial processes, refining, and chemical processing. This area of specialization is important to many industries-aerospace, defense, automotive-as well as to the thermal design of electronic and computer packages.

Suggested technical electives:

Aeronautical Science and Engineering 138
Engineering 111
Mechanical Engineering 161, 163

Suggested Advisers: R.C. Aldredge, R. Davis, P.A. Erickson, I.M. Kennedy, J.W. Park, B.D. Shaw

Manufacturing. Manufacturing is concerned with the conversion of raw materials into finished products by a variety of processes, such as machining, forming, casting, and molding. Modern manufacturing technology is increasingly dependent upon integration with computer-aided design systems and precision computer controls. State-of-the-art laboratories offer the opportunity for hands-on experience with a wide spectrum of manufacturing equipment. Manufacturing engineers must have expertise in design, materials, controls, statistical methods, computer software, and microprocessor applications.

Suggested technical electives:

Electrical and Computer Engineering 160
Materials Science and Engineering 180, 181
Mechanical Engineering 150B, 151, 154

Suggested Advisers: H.H. Cheng, R.T. Farouki, D.A. Horsley, V. La Saponara, B. Ravani, K. Yamazaki

Systems Dynamics and Control. Engineers are increasingly concerned with the performance of integrated dynamics systems in which it is not possible to optimize component parts without considering the overall system.

Systems Dynamics and Control specialists are concerned with the modeling, analysis, and simulation of all types of dynamic systems and with the use of automatic control techniques to change the dynamic characteristics of systems in useful ways. The emphasis in this program is on the physical systems that are closely related to mechanical engineering, but the techniques for studying these systems apply to social, economic, and other dynamic systems.

Ongoing research includes projects on continuously variable transmissions, active and semi-active suspension systems, modeling and control of vehicle dynamics, electromechanical actuator design, electronically controlled steering, the analysis of fuel management systems, and the design of flight-control systems with humans in the loop.

An Automotive System Dynamics Laboratory is being used for testing components such as engines, transmissions, brakes, and steering systems as well as testing complete vehicles.

Suggested technical electives:

Aerospace Science and Engineering 129, 139, 141
Engineering 121, 122
Mechanical Engineering 121, 134, 152

Suggested Advisers: F.O. Eke, A.A. Frank, R.A. Hess, M. Hubbard, S. Joshi, D.C. Karnopp, D.L. Margolis.

Ground Vehicle Systems. An important aspect of mechanical engineering is the design of more environmentally benign surface vehicles that provide efficient individual and public transportation. Innovations in the field require competence in vehicle dynamics, control of vehicle dynamics, power sources and power transmission, lightweight structures and systems, alternatively fueled power systems, including electrical drives and fuel cells, and mechanical systems.

Transportation Systems. As society recognizes the increasing importance of optimizing transportation systems to minimize environmental degradation and energy expenditure, engineers will need to consider major innovations in the way people and goods are moved. Such innovations will require competence in vehicle dynamics, propulsion and control, and an understanding of the problems caused by present-day modes of transportation. Vehicle control requires an understanding of sensors and actuators, and the integration of yet-to-be-proposed concepts into overall vehicular dynamics. Competence in these areas allows for the development of alternative propulsion concepts, such as electric, hybrid, and fuel cell.

Suggested technical electives:

Aerospace Science and Engineering 127, 129
Biological Systems Engineering 114,
Civil and Environmental Engineering 131, 149
Engineering 121, 122, 160 (only one unit of credit towards Technical Electives requirement)
Mechanical Engineering 134, 150B, 161, 162, 163

Suggested Advisers: P.A. Erickson, A.A. Frank, M. Hubbard, J.W. Park, D.C. Karnopp, D.L. Margolis, S. Velinsky

Mechanical Engineering Upper Division Required Courses

Engineering 100, 102, 103, 104, 105 19
Mechanical Engineering 150A and 172; and one course chosen from 185A with 185B (both courses must be taken in consecutive quarters), or Aeronautical Science and Engineering 130A 12
Mechanical Engineering 106, 107A, 107B, 165, 171 18
Engineering 190 3
Select one course from Applied Science Engineering 115; Engineering 180; Mathematics 128C; Statistics 120, 131A 4
Technical electives 24
Sixteen of the 24 units must be selected from upper division courses in engineering; of these units, one course must be chosen from the following: Engineering 122, Mechanical Engineering 121, 150B, 154. Two additional courses must be chosen from the following design courses: Aerospace Science and Engineering 129, 130B, 138, 139, 141, 189A, 189B; Materials Science and Engineering 180, 182; Mechanical Engineering 134, 151, 152, 161, 163. Students may also choose from Aerospace Science and Engineering 130A, Mechanical Engineering 150B, 154, if these courses are not used in satisfaction of the core design requirement above.
A combined maximum of four units may be selected from project/independent study courses (185A, 185B, 192, 199) not used in satisfaction of core degree requirements. The remaining units may be selected from the technical electives list.
General Education electives 8
Minimum Upper Division Units 88

Minimum Units Required for Major 185

The Mechanical Engineering/ Materials Science Undergraduate Program

The Mechanical Engineering/Material Science program is a combined major that offers students a unique interdisciplinary experience requiring work with mechanical engineering and material science and engineering students. In addition to performing work in portions of the mechanical engineering program described above, this program provides the background to understand the structure, properties, and behavior of materials and to pursue these fields in industry and/or graduate scholarship.

Mechanical Engineering/Materials Science Undergraduate Major

The Mechanical Engineering/Materials Science program is not accredited by the Engineering Accreditation Commission of ABET, 111 Market Place, Suite 1050, Baltimore, MD 21202-4012 (410) 347-7700.

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

Mechanical Engineering/Materials Science and Engineering Lower Division Required Courses

The lower division requirements for this program are identical to those for the Mechanical Engineering program. See Mechanical Engineering Programs Lower Division Requirements:, on page 273.

Mechanical Engineering/Materials Science Upper Division Requirements

Students spend their third year in further study of fundamental courses and in their fourth year they may tailor their studies to their interests by selecting courses in materials science, mechanical design, or manufacturing. Students can either prepare for graduate study or obtain a broad background for entering engineering practice

Mechanical Engineering/Materials Science and Engineering Upper Division Required Courses

Engineering 100, 102, 103, 104, 105 19
Mechanical Engineering 106, 107A, 107B, 150A, 165, 171, 172 26
Mechanical Engineering 185A & 185B (both courses must be taken in consecutive quarters), or Materials Science and Engineering 188A & B (both courses must be taken in consecutive quarters) 4
Materials Science and Engineering 160, 162, 164, 174 16
One course chosen from Materials Science and Engineering 172, 180, 181, 182, 188A-B (if not used to satisfy above core requirement) 4
One laboratory course chosen from Materials Science and Engineering 172L or 174L 2
Select one course from Applied Science Engineering 115; Engineering 180; Mathematics 128C; Statistics 120, 131A 4
Engineering 190 3
Technical electives 11
One course must be chosen from the following: Engineering 122, Mechanical Engineering 121, 150B, 154.
Two courses must be chosen from Aerospace Science and Engineering 129,

130B, 138, 139, 189A, 189B; Materials Science and Engineering 147, 180, 181, 182; Mechanical Engineering 134, 151, 152, 161, 163. Students may also choose from Mechanical Engineering 150B, 154 if these courses are not used for a core design requirement above.
A combined maximum of 4 units of courses Mechanical Engineering 185A & B, Materials Science and Engineering 188 A & B or any course numbered 192 or 199 not used in satisfaction of core requirements may be applied to the technical elective degree requirement.

General Education electives..... 8

Minimum Upper Division Units 97

Minimum Units Required for Major 194

The Graduate Program in Mechanical and Aeronautical Engineering

M.S., M.Engr., D.Engr. and Ph.D.
Professional Certificate
Designated Ph.D. emphasis available in Biotechnology
(530) 752-0581

The defining element of graduate study in the Mechanical and Aeronautical Engineering Program is interdisciplinary design. Research within this Graduate Program advances design in diverse fields such as vehicles, biomechanics, aerostructures, sensors, combustion, and energy systems. Graduate students acquire skills to address both fundamental issues in these areas and to design complex, multicomponent systems. The highly collaborative environment fosters multidisciplinary research while drawing on the study of mathematics, electrical engineering, materials science, bioengineering and nanotechnology in addition to the core areas. Recruiters from industry are active here, knowing that, in addition to having hands-on design experience, our students are well-grounded in engineering fundamentals. They study with professors who "wrote the book" on their discipline, and work on design projects with researchers who are international authorities in their field. Our graduate students are able to work closely with faculty in a friendly but demanding environment where teamwork and faculty mentoring are important, as is the cross-disciplinary, collaborative culture that is unique to UC Davis.

Research Highlights:

- Aeronautics and Aerostructures
- Space Systems
- Flight Dynamics and Control
- Computational Fluid Dynamics
- Dynamic Systems and Controls
- Reacting Flows
- Heat Transfer
- Automotive System Dynamics
- Biofluid Mechanics
- Biosensors/Microelectromechanical Systems (MEMS)
- Biosolid Mechanics
- Manufacturing and Mechanical Design
- Sports Biomechanics
- Energy Systems/Fuel Cell/Hybrid Vehicle Technology
- Robotics
- Wind Energy

Research Facilities and Partnerships:

- Center for Computational Fluid Dynamics
- Institute of Transportation Studies
- Center for Advanced Highway Maintenance and Construction Technology
- GATE Center for Hybrid Electric Vehicles
- Aeronautical Wind Tunnel Facility

Complete Information on our website at *http://mae.ucdavis.edu/grad_studies/*.

Courses in Engineering: Mechanical (EME)

Courses in Mechanical Engineering (EME) are listed below; courses in Aerospace Science and Engineering (EAE) are listed immediately following; graduate courses in Mechanical and Aeronautical Engineering (MAE) follow.

Lower Division Courses

1. Mechanical Engineering (1)
Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications, discussions of the practice with respect to engineering principles, ethics, and responsibilities. (P/NP grading only.)—I. (I.)

5. Computer Programming for Engineering Applications (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 16A or 21A (may be taken concurrently). Structured programming in C for solving problems in engineering. Introduction to MATLAB and comparison study of C/C++ with MATLAB. Not open for credit to students who have completed course 124.—I. (I.) Cheng

50. Manufacturing Processes (4)
Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: Engineering 4, grade of C- or better; Physics 9A. Restricted to Mechanical Engineering, Aeronautical Science and Engineering, and Mechanical Engineering/Materials Science Engineering majors. Modern manufacturing methods, safety, manufacturing instructions, computer-aided manufacturing and their role in the engineering design and development process.—I, II. (I, II.) Farouki, Schaaf, Yamazak

92. Internship in Mechanical Engineering (1-5)
Internship. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work-study experience in engineering. May be repeated for credit. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

Upper Division Courses

106. Thermo-Fluid Dynamics (4)
Lecture—4 hours. Prerequisite: Engineering 103 and 105. Restricted to Mechanical Engineering, Aeronautical Engineering and Mechanical Engineering/Materials Science Engineering majors. Inviscid incompressible flow, compressible flow, thermodynamic relations, ideal gas mixtures, psychrometrics, reacting mixtures and combustion.—I, II, III. (I, II, III.) Delplanque, Park, Shaw

107A. Experimental Methods (3)
Lecture—2 hours; laboratory—1.5 hours. Prerequisite: course 106; open to Mechanical Engineering, Aeronautical Science & Engineering and Mechanical/Materials Science Engineering Majors only. Experiments to illustrate principles of thermal-fluid systems. Statistical and uncertainty analysis of data; statistical design of experiments; measurement devices; Experiments involving thermodynamic cycles, combustion, compressible and incompressible flows. Two units of credit for students who have previously taken Chemical and Materials Science Engineering 155A. One unit of credit for students who have taken Chemical and Materials Science Engineering 155B. Two units of credit for students who have taken Civil and Environmental Engineering 141L.—I, II, III. (I, II, III.) Erickson, Kennedy, Park, Shaw

107B. Experimental Methods (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 100 and 102. Open to Mechanical Engineering, Aeronautical Science & Engineering and Mechanical/Materials Science & Engineering. Experiments to illustrate principles of mechanical systems. Theory of measurements; Signal analysis; Demonstration of basic sensors for mechanical systems; Experimental project design; Experiments involving voltage measurement; strain gauges, dynamic systems of 0th, 1st and 2nd order. Only two units of credit for students who have previously taken Biomedical Engineering 111. Only one unit of credit for students who have previously taken Biological Systems Engineering 165.—I, II, III. (I, II, III.) Frank, Hill, Horsley, La Saponara

121. Engineering Applications of Dynamics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 102. Open to students in the College of Engineering. Technical elective that revisits dynamic principles with emphasis on engineering applications; stressing importance of deriving equations of motion and setting these into format for computer solution with computer simulation lab, students gain experience with solving complex, real engineering applications.—III. (III.) Karnopp, Margolis

134. Vehicle Stability (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 171. Introduction to the static and dynamic stability characteristics of transportation vehicles with examples drawn from aircraft, high-performance automobiles, rail cars and boats. Laboratory experiments illustrate the dynamic behavior of automobiles, race cars, bicycles, etc.—III. (III.) Karnopp

150A. Mechanical Design (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45 and 104; Mechanical Engineering 50 (may be taken concurrently). Principles of engineering mechanics applied to mechanical design. Theories of static and fatigue failure of metals. Design projects emphasizing the progression from conceptualization to hardware. Experimental stress analysis and mechanical measurements using strain gages.—I, III. (I, III.) Hill, Hull, Ravani

150B. Mechanical Design (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Principles of engineering mechanics applied to the design and selection of mechanical components. Design projects, which concentrate on conceptual design, engineering analysis, methods of manufacture, material selection, and cost. Introduction to Computer-Aided Design.—II. (II.) Farouki, Ravani

151. Statistical Methods in Design and Manufacturing (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 107B, 150A. Methods of statistical analysis with emphasis on applications in mechanical design and manufacturing. Applications include product evaluation and decision making, stress-strength interference, probabilistic design, systems reliability, and fatigue under random loading.—II. (II.) Hull

152. Computer-Aided Mechanism Design (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or Engineering 6 and 102. Principles of computer-aided mechanism design. Computer-aided kinematic, static, and dynamic analysis and design of planar mechanisms such as multiple-loop linkages and geared linkages. Introduction to kinematic synthesis of mechanisms.—II. (II.) Cheng

154. Mechatronics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100, 102, course 50. Mechatronics system concept and overview, control system design overview, control software architecture, control hardware architecture, microcontroller and interface tech-

nology for mechatronics control, sensor for mechatronics systems, actuator drives.—III. (III.) Yamazaki

161. Combustion and the Environment (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 106. Introduction to combustion kinetics; the theory of pre-mixed flames and diffusion flames; turbulent combustion; formation of air pollutants in combustion systems; examples of combustion devices which include internal combustion engines, gas turbines, furnaces and waste incinerators; alternative fuel sources.—(III.) Shaw

163. Internal Combustion Engines and Future Alternatives (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103 and 105. Fundamentals of internal combustion engine design and performance. Future needs to adapt to environmental concerns, and the feasibility of better alternatives in the future.—III. (III.) Erickson

165. Heat Transfer (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 5 or Engineering 6, 103 and 105. Conduction, convection, and radiation heat transfer. Computational modeling of heat transfer in engineering. Applications to engineering equipment with the use of digital computers.—I, III. (I, III.) Aldredge, Kennedy, Shaw

171. Analysis, Simulation and Design of Mechatronic Systems (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100 and 102, upper division standing. Modeling of dynamic engineering systems in various energy domains. Analysis and design of dynamic systems. Response of linear systems. Digital computer simulation and physical experiments.—I, II. (I, II.) Horsley, Karnopp, Margolis

172. Automatic Control of Engineering Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 171, Engineering 100. Classical feedback control; block diagrams; control systems performance specifications; steady state errors; rise and settling times; root locus; PID controllers; control design with Bode and Nyquist plots; stability; phase and gain margin; lead and lag compensators; state variable feedback controllers.—II, III. (II, III.) Eke, Farouki, Horsley

185A-185B. Mechanical Engineering Systems Design Project (2-2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 150A, 165, senior standing in Mechanical Engineering or Aeronautical Science and Engineering. Capstone mechanical engineering design course; the mechanical engineering design process and its use in the design of engineering systems. (Deferred grading only, pending completion of sequence.)—I-II, II-III. (I-II, II-III.) Velinsky, C. Davis

189A-L. Selected Topics in Mechanical Engineering (1-5)
Prerequisite: consent of instructor. Directed group study of selected topics in separate sections in (A) Energy Systems and the Environment, (B) Engineering Controls, (C) Engineering Dynamics, (D) Biomechanics, (E) Fluid Mechanics, (F) Manufacturing Engineering, (G) Mechanical Engineering and Product Design, (H) Mechatronics Systems, (I) MEMS/Nanotechnology, (J) Solid and Structural Mechanics, (K) Thermodynamics, (L) Vehicle and Transportation Systems. May be repeated for credit when the topic is different.

192. Internship in Engineering (1-5)
Internship. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in mechanical engineering. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Courses in Aerospace Science and Engineering (EAE)

Lower Division Courses

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

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

Upper Division Courses

126. Theoretical and Computational Aerodynamics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 106, Engineering 180, Applied Science Engineering 115, or Mathematics 128C. Development of general equations of fluid motion. Study of flow field kinematics and dynamics. Flow about a body. Thin airfoil theory. Viscous effects. Applications of numerical methods to wing analysis and design.—III. (III.) Hafez

127. Applied Aircraft Aerodynamics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 126. Experimental characteristics of wing sections. High-lift devices. Lift and drag at high Mach numbers. Drag aerodynamics. Total aircraft drag estimation. Aerodynamic design procedures.—I. (I.) Chattot

129. Stability and Control of Aerospace Vehicles (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102. Restricted to upper division standing. Aircraft and spacecraft stability and control. Derivation of fundamental equations of motion for aircraft/spacecraft. Specialization of equations for aircraft. Fundamentals of feedback. Aircraft flight control systems. Specialization of equations of motion for orbiting spacecraft. Spacecraft attitude control systems.—II. (II.) Hess

130A. Aircraft Performance and Design (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 127. Aircraft design including aerodynamics, performance analysis, weight estimation, and stability and control.—II. (II.) van Dam

130B. Aircraft Performance and Design (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 130A. Aircraft design including refinement and iteration of initial design; cost analysis, detailed design, and analysis of aircraft structure; propulsion system; aerodynamics, stability, and control/handling qualities; or manufacturing.—III. (III.) van Dam

133. Finite Element Methods in Structures (4)
Lecture—3 hours; laboratory—3 hours. Prerequisites: Engineering 104. Open to Engineering students only. An introduction to the aerospace structural design process. History of aircraft materials. Effects of loading beyond elastic limit. Deflections and stresses due to combined loading. Virtual work principles, and finite element methods. Applications to aerospace structures.—I. (I.) Sarigul-Klijn

135. Aerospace Structures (4)
Lecture—4 hours. Prerequisite: course 133. Analysis and design methods used in aerospace structures. Shear flow in open, closed and multicell beam cross-sections, buckling of flat and curved sheets, tension field beams, local buckling.—II. (II.) La Saponara

137. Structural Composites (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104. Overview of materials and technology for creating structures from fiber reinforced resin matrix composite material systems. Elementary design analysis and case studies emphasizing aeronautical applications.—II. (II.) Wack

138. Aircraft Propulsion (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45, 103, and 105; Mechanical Engineering 106. Analysis and design of modern aircraft gas turbine engines. Development and application of cycle performance prediction techniques for important engine configurations. Introduction to the operation and design of inlets, compressors, burners, turbines, and nozzles. Cycle design studies for specific applications.—II. (II.) R. Davis

139. Structural Dynamics and Aeroelasticity (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 102 and 103. Structural dynamics of flexible structures. Introduction to fluid-structure interaction. Design of subsystems or systems under aeroelastic constraints. Dynamics instabilities. Control effectiveness. Unsteady aerodynamics. Flutter. Aeroelastic tailoring in design, Applications to aerospace, mechanical and biomedical systems.—III. (III.) Sarigul-Klijn

141. Space Systems Design (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Engineering 102, and Mechanical Engineering 106. Introduction to space systems design including space project organization, requirements definition and specification, concepts formulation, system tradeoffs, subsystem design. Prototype space mission concepts are presented and a multidisciplinary mission design is developed that considers all relevant architecture elements. Offered in alternate years.—(I.) Joshi

189A. Rocket Propulsion (4)
Lecture—4 hours. Prerequisite: Engineering 103 and 105, upper division standing. Fluid and thermodynamics of rocket engines, liquid and solid rocket propulsion. Space propulsion concepts and space mission requirements.—Hafez

189B. Orbital Mechanics (4)
Lecture—4 hours. Prerequisite: course 102, upper division standing. Satellite orbits, multistage rockets, current global boosters, and new technologies. Design application problems include satellites, trajectory optimizations, and interplanetary trajectories.

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Courses in Mechanical and Aeronautical Engineering (MAE)

(Formerly courses in Aeronautical Science and Engineering and Mechanical Engineering.)

Graduate Courses

207. Engineering Experimentation and Uncertainty Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 107A and 107B. Design and analysis of engineering experiments with emphasis on measurement standards, data analysis, regressions and general and detailed uncertainty analysis, including statistical treatment of experimental data intervals, propagation of bias and precision errors, correlated bias approximations, and using jitter programs.—(II.) C. Davis

208. Measurement Methods in Fluid Mechanics and Combustion (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 165 and Engineering 103. Application of shadow, schlieren and other flow visualization methods. Introduction to optics and lasers. Measurement

of velocity and concentrations in reacting and nonreacting flows with laser diagnostic techniques including LDV, Rayleigh, Raman and fluorescence scattering and CARS. Offered in alternate years.

210A. Advanced Fluid Mechanics and Heat Transfer (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103, 105 and Mechanical Engineering 165. Development of differential equations governing continuity, momentum and energy transfer. Solutions in laminar flow for exact cases, low and high Reynolds numbers and lubrication theory. Dynamics of inviscid flow.—I. (I.) Aldredge, Barakat, White

210B. Advanced Fluid Mechanics and Heat Transfer (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A. Study of stability and transition to turbulence. Introduction to the physics of turbulence. Modeling of turbulence for numerical determination of momentum and heat transfer.—(II.) Aldredge, Kennedy

211. Fluid Flow and Heat Transfer (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103, 105 and Mechanical Engineering 165 or the equivalent. Design aspects of selected topics; heat conduction, fins; heat transport in ducts, boundary layers and separated flows; heat exchangers.—I. (I.) Erickson, Park

212. Biomedical Heat and Mass Transport Processes (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 165, Biological Systems Engineering 125, Chemical Engineering 153 or the equivalent. Application of principles of heat and mass transfer to biomedical systems related to heat exchange between the biomedical system and its environment, mass transfer across cell membranes and the design and analysis of artificial human organs. (Same course as Biomedical Engineering 212.) Offered in alternate years.—(II.) Aldredge

213. Advanced Turbulence Modeling (4)
Lecture—4 hours. Prerequisite: course 210B. Methods of analyzing turbulence; kinematics and dynamics of homogeneous turbulence; Reynolds stress and heat-flux equations; second order closures and their simplification; numerical methods; application to boundary layer-type flows; two-dimensional and three-dimensional hydraulic and environmental flows. Offered in alternate years.—(III.) Aldredge

215. Biomedical Fluid Mechanics and Transport Phenomena (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 or Chemical Engineering 150B or Civil and Environmental Engineering 141. Application of fluid mechanics and transport to biomedical systems. Flow in normal physiological function and pathological conditions. Topics include circulatory and respiratory flows, effect of flow on cellular processes, transport in the arterial wall and in tumors, and tissue engineering. (Same course as Biomedical Engineering 215.)—(III.) Barakat

216. Advanced Thermodynamics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 105. Study of topics important to energy conversion systems, propulsion and other systems using high temperature gases. Classical thermodynamics and quantum statistical mechanics of nonreacting and chemically reacting gases, gas mixtures, and other substances.—(III.) Shaw

217. Combustion (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 and 105. Review of chemical thermodynamics and chemical kinetics. Discussions of reacting flows, their governing equations and transport phenomena; detonations; laminar flame structure and turbulent combustion. Offered in alternate years.—II. Aldredge, Kennedy, Shaw

218. Advanced Energy Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 and 105, or the equivalent. Review of options available for advanced power generation. Detailed study of basic power balances, component efficiencies, and overall powerplant performance for one advanced concept such as a fusion, magnetohydrodynamic, or solar electric powerplant. Offered in alternate years.—(I.)

219. Introduction to Scientific Computing in Solid and Fluid Dynamics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103 and 104. Scientific calculations with finite element and finite difference methods for multi-dimensional problems in solid and fluid dynamics are performed with examples in C, C++, FORTRAN, and MATLAB script files. Derivation of the basic equations of motion in finite volume form with applications to elasticity, waves. Offered in alternate years.—(III.) Delplanque

220. Mechanical Vibrations (4)
Lecture—4 hours. Prerequisite: Engineering 122. Multiple degrees of freedom; damping measures; Rayleigh's method; vibration absorbers; eigenvalues and modeshapes; modal coordinates; forced vibrations; random processes and vibrations; autocorrelation; spectral density; first passage and fatigue failure; nonlinear systems; phase plane.—III. (III.) Hubbard

222. Advanced Dynamics (4)
Lecture—4 hours. Prerequisite: Engineering 102. Dynamics of particles, rigid bodies and distributed systems with engineering applications; generalized coordinates; Hamilton's principle; Lagrange's equations; Hamilton-Jacobi theory; modal dynamics orthogonality; wave dynamics; dispersion.—I. (I.) Karnopp

223. Multibody Dynamics (4)
Lecture—4 hours. Prerequisite: Engineering 102. Coupled rigid-body kinematics/dynamics; reference frames; vector differentiation; configuration and motion constraints; holonomicity; generalized speeds; partial velocities; mass; inertia tensor/theorems; angular momentum; generalized forces; comparing Newton/Euler, Lagrange's, Kane's methods; computer-aided equation derivation; orientation; Euler; Rodrigues parameters. (Same course as Biomedical Engineering 223.)—II. (II.) Eke, Hubbard

225. Spatial Kinematics and Robotics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: C Language and course 222. Spatial kinematics, screw theory, spatial mechanisms analysis and synthesis, robot kinematics and dynamics, robot workspace, path planning, robot programming, real-time architecture and software implementation. (Same course as Biomedical Engineering 225.) Offered in alternate years.—III. Ravani

226. Acoustics and Noise Control (4)
Lecture—4 hours. Prerequisite: Engineering 122. Description of sound using normal modes and waves; interaction between vibrating solids and sound fields; sound absorption in enclosed spaces; sound transmission through barriers; applications in design, acoustic enclosures and sound walls, room acoustics, design of quiet machinery. Offered in alternate years.—(III.) Karnopp, Sarigul-Klijn

227. Research Techniques in Biomechanics (4)
Lecture—2 hours; laboratory—4 hours; term paper or discussion—1 hour. Prerequisite: Mathematics 22B and consent of instructor; Exercise Science 115 recommended. Experimental techniques for biomechanical analysis of human movement. Techniques evaluated include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional videography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as Biomedical Engineering 227/Exercise Science 227.)—II. (II.) Williams, Hawkins

229. Design & Analysis of Micro-Electromechanical Systems (4)
Lecture—4 hours. Prerequisite: consent of instructor; Engineering 45, 100, 104; Engineering 122 recommended. Mechanical design of micro-electronmechanical systems (MEMS). Device modeling: lumped parameter models; energy methods; nonlinearities; electrical and mechanical noise sources. Actuation and measurement methods: capacitive, piezoresistive, thermal, piezoelectric, and optical techniques. Review of basic electronics: bridge circuits, amplitude modulation; lock-in detection.—(III.) Horsley

231. Musculo-Skeletal System Biomechanics (4)
Lecture—4 hours. Prerequisite: Engineering 102. Mechanics of skeletal muscle and mechanical models of muscle, solution of the inverse dynamics problem, theoretical and experimental methods of kinematic and kinetic analysis, computation of intersegmental load and muscle forces, applications to gait analysis and sports biomechanics. (Same course as Biomedical Engineering 231.)—(III.) Hull

232. Skeletal Tissue Mechanics (3)
Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104B. Overview of the mechanical properties of the various tissues in the musculoskeletal system, the relationship of these properties to anatomic and histologic structure, and the changes in these properties caused by aging and disease. The tissues covered include bone, cartilage and synovial fluid, ligament and tendon. (Same course as Biomedical Engineering 232.)—III. (III.) Fyhrie

234. Design and Dynamics of Road Vehicles (4)
Lecture—4 hours. Prerequisite: Mechanical Engineering 134. Analysis and numerical simulation of road vehicles with on design applications. Offered in alternate years.—(III.) Velinsky

236. Aerodynamics in Nature and Technology (4)
Lecture—4 hours. Prerequisite: Engineering 103. Introduction to aerodynamics in nature, fundamentals of turbulence in atmospheric flows, planetary boundary layers, pedestrian-level winds in urban areas. Criteria for laboratory modeling of atmospheric flows, wind-tunnel testing. Offered in alternate years.—(III.) White

237. Analysis and Design of Composite Structures (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Aeronautical Science and Engineering 137. Modeling and analysis methodology for composite structures including response and failure. Laminated plate bending theory. Introduction to failure processes. Offered in alternate years.—(III.) La Saponara

238. Advanced Aerodynamic Design and Optimization (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Application of aerodynamic theory to obtain optimum aerodynamic shapes. Both analytic solutions and solutions obtained with numerical optimization techniques will be examined. Includes introduction to the calculus of variations and numerical optimization techniques. Offered in alternate years.—(I.) van Dam

239. Advanced Finite Elements and Optimization (4)
Lecture—4 hours. Prerequisite: Engineering 180 or Applied Science 115 or Mathematics 128C. Introduction to advanced finite elements and design optimization methods, with application to modeling of complex mechanical, aerospace and biomedical systems. Application of states of the art in finite elements in optimum design of components under realistic loading conditions and constraints. Offered in alternate years. (Same course as Biomedical Engineering 239.)—(II.) Sarigul-Klijn

240. Computational Methods in Nonlinear Mechanics (4)
Lecture—4 hours. Prerequisite: Applied Science Engineering 115 or Mathematics 128B or Engineering 180. Deformation of solids and the motion of fluids treated with state-of-the-art computational methods. Numerical treatment of nonlinear dynamics; classification of coupled problems; applications of finite element methods to mechanical, aeronautical, and biological systems. Offered in alternate years. (Same course as Biomedical Engineering 240.)—(II.) Sarigul-Klijn

242. Stability of Thin-Walled Structures (4)
Lecture—4 hours. Prerequisite: Engineering 104 or equivalent. Static stability of thin-walled aerospace structures treated from both theoretical and practical design perspectives. Both monolithic and composite construction considered. Buckling of stiffened panels, shells, and thin-walled beams, experimental methods and failure/crippling processes. Offered in alternate years.—III. La Saponara

248. Advanced Turbomachinery (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 and 105. Preliminary aerodynamic design of axial and radial flow compressors and turbines. Design of diffusers. Selection of turbomachine and configurations and approximations to optimum dimensions and flow angles. Introduction to through flow analysis. Rotating stall and surge, and aeromechanical considerations. Offered in alternate years.—I. R. Davis

250A. Advanced Methods in Mechanical Design (4)
Lecture—4 hours. Prerequisite: Mechanical Engineering 150A and 150B or the equivalents, or consent of instructor. Applications of advanced techniques of solid mechanics to mechanical design problems. Coverage of advanced topics in stress analysis and static failure theories with emphasis in design of machine elements. Design projects emphasizing advanced analysis tools for life cycle evaluation.—I. (I.) Ravani

250B. Advanced Methods in Mechanical Design (4)
Lecture—4 hours. Prerequisite: course 250A. Applications of advanced techniques of solid mechanics to mechanical design problems. Advanced topics in variational methods of mechanics with emphasis in design of machine elements. Design projects emphasizing advanced analysis tools.—II. (II.) Hill

250C. Mechanical Performance of Materials (4)
Lecture—4 hours. Prerequisite: undergraduate course in stress analysis and mechanical behavior of materials. Occurrence, mechanisms, and prediction of fatigue and fracture phenomenon. Use of stress and strain to predict crack initiation. Use of fracture mechanics to predict failure and crack propagation. Effects of stress concentration, manufacturing, load sequence, irregular loading, and multi-axial loading. Offered in alternate years.—(III.) Velinsky

251. Mechatronics System Design (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 154 and 172 or Electrical and Computer Engineering 157A, 157B. Motion mechanism design, electric actuator, power electronics motion control, sensor technologies, personal computer-based control systems design, motion control general operating system and real time operating systems, motion control software design, discrete event control software design. Offered in alternate years.—II. Yamazaki

252. Information Processing for Autonomous Robotics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 6, Mechanical Engineering 5, or equivalent programming experience, Mechanical Engineering 154, 171, or consent of instructor. Computational principles for sensing, reasoning, and navigation for autonomous robots. Offered in alternate years.—(II.) Joshi

254. Engineering Software Design (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Mechanical Engineering 5, Engineering 180. Principle and design of engineering software. Advanced topics in engineering software design, applications of object-oriented programming, very high-level languages, real-time multi-thread computing and sensor fusion, Web-based network computing, graphics, and GUI in engineering. Offered in alternate years.—(III.) Cheng

255. Computer-Aided Design and Manufacturing (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: proficiency in a high level programming language such as Fortran, Pascal, or C. Representation and processing of geometrical information in design and manufacturing. Numeric and symbolic computations. Coordinate systems and transformations. Bezier and B-spline curves and surfaces. Interpolation and approximation methods. Intersections, offsets, and blends. Path planning for machining, inspection, and robotics applications. Offered in alternate years.—(III.) Farouki

258. Hybrid Electric Vehicle System Theory and Design (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Mechanical Engineering 150B, graduate standing in Mechanical and Aeronautical Engineering. Advanced vehicle design for fuel economy, performance, and low emissions, considering regulations, societal demands and manufacturability. Analysis and verification of computer design and control of vehicle systems in real vehicle tests. Advanced engine concepts. Offered in alternate years.—(II.) Frank

261. Gas Dynamics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 or the equivalent. Flow of compressible fluids. Isentropic flow. Flow with friction, heat transfer, chemically reacting gas and particle mixtures. Normal and oblique shock waves, combustion, blast and expansion waves. Method of characteristics. Offered in alternate years.—II. Chattot

262. Advanced Aerodynamics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Aeronautical Engineering 126. Study of invicid and viscous flows about aerodynamic shapes at subsonic, transonic and supersonic conditions. Application of aerodynamic theory to design for reduced drag and increased lift. Offered in alternate years.—II. Hafez

263. Introduction to Computational Aerodynamics and Fluid Dynamics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103 or consent of instructor. Introduction to numerical methods for solution of fluid flow problems. Discretization techniques and solution algorithms. Finite difference solutions to classical model equations pertinent to wave phenomena, diffusion phenomena, or equilibrium. Application to the incompressible Navier-Stokes equation. Offered in alternate years.—(II.) Chattot

264. Computational Aerodynamics (4)
Lecture—4 hours. Prerequisite: Aeronautical Science and Engineering 126, Engineering 180, or consent of instructor. Numerical methods for aerodynamics flow simulation in the transonic regime. Solutions of steady and unsteady potential and compressible boundary layer equations. Numerical schemes for mixed type equations and shock waves/numerical grid generation. Viscous/inviscid interaction and coupling procedures. Offered in alternate years.—(II.) Hafez

266. Advanced Wind-Tunnel Testing (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: undergraduate course in fluid dynamics. Aspects of low-speed wind-tunnel testing for solving aeronautical and non-aeronautical problems including tunnel corrections, scale effects, force and moment measurements, and flow visualization. Offered in alternate years.—(III.) van Dam

267. Parallel Computations in Fluid/Thermal Sciences (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: Mechanical Engineering 106, 165, Engineering 180 or equivalent; or consent of instructor. Programming languages and constructs for engineering analysis on parallel computers including MPI (distributed), OpenMP (shared), and Fortran95. Graduate or junior/senior undergraduate as a technical elective—(I.) R. Davis

268. Wind Power Engineering (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102 and 103, or equivalent, or consent of instructor. Fundamentals for understanding the conversion of wind power to mechanical power and electricity. Related engineering, economic and societal issues. Offered in alternate years.—I. van Dam

269. Fuel Cell Systems (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: Mechanical Engineering 106, 107, 165, or equivalent, or consent of instructor; graduate or junior/senior undergraduate as a technical elective. Basics of electrochemistry and fuel cell engines in mobile and stationary applications. Aspects of fuel cell energy converters and their subsystems including practice with existing fuel cell and hydrogen systems on campus. Limited enrollment. Offered in alternate years.—I. Erickson

271. Advanced Modeling and Simulation of Mechatronic Systems (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Mechanical Engineering 172 or the equivalent. Multiport models of mechanical, electrical, hydraulic, and thermal devices; bond graphs, block diagrams and state space equations; modeling of multiple energy domain systems; three-dimensional mechanics; digital simulation laboratory.—I. (I.) Karnopp, Margolis

272. Theory and Design of Control Systems (4)
Lecture—4 hours. Prerequisite: Mechanical Engineering 172 or the equivalent. Mathematical representations of linear dynamical systems. Feedback principles; benefits and cost of feedback. Analysis and design of control systems based on classical and modern approaches, with emphasis on applications to mechanical and aeronautical systems.—II. (II.) Horsley, Karnopp

274. Analysis and Design of Digital Control Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mechanical Engineering 172. Discrete systems analysis; digital filtering; sample data systems; state space and transform design techniques; quantization effects; multi-input, multi-output systems. Offered in alternate years.—(III.) Hess

275. Advance Aircraft Stability and Control (4)
Lecture—3 hours; discussion—1 hour. Development and analysis of aircraft equations of motion. Flexible modes. Response to control actuation. Random inputs and disturbances. Stability and control augmentation system design. Handling qualities. Offered in alternate years.—III. Hess

276. Data Acquisition and Analysis (4)
Lecture—3 hours; discussion—1 hour. Application of computers for data acquisition and control. Topics include computer architecture, characteristics of transducers, hardware for laboratory applications of computers, fundamentals of interfaces between computers and experimental equipment, programming techniques for data acquisition and control, basic data analysis. Offered in alternate years.—II. Hill

290C. Graduate Research Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in mechanical and aeronautical engineering research. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

297. Seminar (1)
Discussion—1 hour. Prerequisite: consent of instructor. Current topics in engineering including developments in mechanical and aeronautical engineering with presentations by students, faculty, and visitors. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

390. The Teaching of Aeronautical Science and Engineering (1)
Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Aeronautical Science and Engineering. Methods of leading discussion groups or laboratory sections, writing and grading quizzes, use of laboratory equipment, and grading laboratory reports. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

English

(College of Letters and Science)

Scott Simmon, Ph.D., Chairperson of the Department

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Mark Jerng, Ph.D., Assistant Professor
Alessa Johns, Ph.D., Associate Professor
Richard A. Levin, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Yiyun Li, M.F.A., Assistant Professor
Christopher Loar, Ph.D., Assistant Professor
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John Marx, Ph.D., Associate Professor
Colin Milburn, Ph.D., Associate Professor
Elizabeth Miller, Ph.D., Assistant Professor
Timothy Morton, D. Phil., Professor
Parama Roy, Ph.D., Professor
Scott C. Shershow, Ph.D., Professor
Scott Simmon, Ph.D., Professor
David Simpson, Ph.D., Professor
Matthew Stratton, Ph.D., Assistant Professor
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Evan Watkins, Ph.D., Professor
Joe Wenderoth, M.F.A., Professor
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Linda A. Morris, Ph.D., Professor Emerita
James J. Murphy, Ph.D., Professor Emeritus
Marijane Osborn, Ph.D., Professor Emerita
David A. Robertson, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Winfried Schleiner, Ph.D., Professor Emeritus
Gwendolyn Schwabe, M.S., Senior Lecturer Emerita
Daniel Silvia, Ph.D., Professor Emeritus
Gary Snyder, B.A., Professor Emeritus
David Van Leer, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Raymond B. Waddington, Ph.D., Professor Emeritus
James L. Woodress, Ph.D., Professor Emeritus
Karl F. Zender, Ph.D., Professor Emeritus

The Major Program

The study of English develops skills in reading analytically and perceptively and in writing clearly and effectively.

The Program. The English department offers three kinds of courses: composition courses, undergraduate courses, and graduate courses. Composition courses develop skills in reading analytically and in writing persuasively. Undergraduate and graduate courses cover the entire range of English and American literature, as well as creative writing. Students majoring in English may elect a creative writing emphasis or a literature, criticism, and theory emphasis. All majors take courses introducing them to the literatures of various periods and places, to critical theory, and to frontiers of literary expression, such s the relationship of literature to environmentalism or the emergence of new media. The creative writing emphasis focuses on fiction, poetry, and article writing. The literature, criticism, and theory emphasis focuses on advanced critical analysis and research. All majors have the opportunity to work with distinguished writers, critics, scholars, and teachers.

Career Alternatives. Graduates have found the major excellent pre-professional training for graduate study in English, as well as for careers in teaching, writing, law, medicine, and library work. Many graduates are employed in journalism, publishing, advertising, and public information. Others have worked in local, state, and federal government agencies, as well as in industry and agriculture. Some have established their own businesses.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter.....20
English 3 or University Writing Program 1..... 4
One course from ENL 40, 43, 44, 45 4
English 10A, 10B, 10C..... 12

Depth Subject Matter 44
English 110A or 110B 4
Please note that English 110A or 110B is a prerequisite for advanced study in the major.

Historical Distribution Requirements.....20
Three courses focusing on literature written in English before 1800, at least one of which must be on literature written primarily before 1500:
Before 1500
English 111, 113A, 113B
1500-1800
English 115, 117, 122, 123, 142, 150A, 155A
One course focusing on literature written in English between 1800 and 1900:
English 130, 133, 143, 144, 152, 155B, 158A, 181A
One course focusing on literature written in English between 1900 and present:
English 137N, 138, 146N, 147, 150B, 155C, 156, 158B, 166, 167, 168, 181B

Non-Historical Distribution Requirements.....8
One course on literature and ethnicity, literature and gender, or literature and sexuality:
English 139, 166, 167, 178, 179, 181A, 181B, 185A, 185B, 186
One course in film and media studies, language studies, cultural studies and contexts, literature and science/technology, or literature and the environment:
English 105, 106, 107, 160, 161A, 161B, 162, 164/STS 164, 171A, 171B, 173, 180, 182, 183, 184
Please note that while some courses are identified as fulfilling more than one distribution requirement, a given course can only fulfill one such requirement.

Area of Emphasis (choose one).....12
Literature, Criticism, and Theory
One upper division English elective
Two advanced courses, one of which can be a Seminar:
English 149, 153, 159, 165, 177, 187A, 188A, 189, 194H, 195H
Creative Writing
Three sections of English 100F, 100P, 100NF, 100FA, 100PA

Total Units for the Major 64

English Majors. Up to four upper division units in a national literature other than English or American, or in Comparative Literature, may count toward the requirements of the major.

Major Advisers. D. P. Abbott, G. Bloom, N. Brown, S. Chaganti, J. Clover, L. Corin, J.F. Diehl, G. Dobbins, F. Dolan, M. Ferguson, K. Frederickson, L. Freed, E. Freeman, W.J. Hicks, P. Houston, H. Hsu, M. Jerng, A. Johns, R.A. Levin, Y. Li, C. Loar, D. Martín, J. Marx, C. Milburn, E. Miller, T. Morton, P. Roy, S. Shershow, S. Simmon, D. Simpson, M. Stratton, C. Waters, E. Watkins, J. Wenderoth, A.B. Williamson, M. Ziser

Meeting for Majors. All new and prospective English majors are invited to attend a general meeting for majors at the beginning of each year; all English majors should see the undergraduate staff adviser, individually, in the spring quarters of their sophomore and junior years.

Foreign Languages. Students who contemplate advanced study in English should prepare for foreign language requirements for higher degrees and should consult with the graduate adviser.

Undergraduate Adviser. See Department website at http://english.ucdavis.edu or the Departmental Advising Office in 177 Voorhies Hall.

Minor Program Requirements:

UNITS

English.....20
Five upper division courses, at least four of which will be literature courses.....20

Honors and Honors Program. A Senior Honors Program is available to an invited group of English majors, who prepare and write a Senior Thesis (either a research paper or creative writing) in their final year. The critical honors program consists of four units of 194H and four units of 195H, normally taken during Winter and Spring quarters of the senior year. The creative writing honors program consists of four units of 100FA or 100PA, normally taken during Spring quarter of the junior year, and four units of 195H, normally taken Winter quarter of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. Eligibility criteria and application materials may be obtained at the Undergraduate Advising office in 177 Voorhies Hall. For more details, see Graduation Honors, on page 81.

Education Abroad options. The department strongly encourages interested students to pursue their studies abroad. It is possible for students to complete significant portions of the English major provided that the course is evaluated as at least four UC Davis units; the course is considered upper division by the standards set forth by the Education Abroad Center; the student presents copies of the coursework, syllabus, and writing assignments to the department's advising staff.

Teaching Credential Subject Representative. See the Teacher Education program.

Graduate Study. The Department of English offers programs of study and research leading to the M.A. in literature and creative writing and the Ph.D. in literature. Detailed information may be obtained from the graduate adviser or the Chairperson of the Department.

The department's affiliation with the Critical Theory Program also provides the opportunity for students in English to prepare for the designated emphasis in Critical Theory (an interdisciplinary program in theories and methodologies in the humanities and social sciences).

Graduate Director. Gina Bloom, Ph.D.

Entry Level Writing. Students must have met the Entry Level Writing requirement before taking any course in English. C. Bates, Director.

Prerequisites. English 3 or University Writing Program 1 is required for admission into all preparatory courses (40, 43, 44, 45, 10A, 10B, 10C), and all upper division courses, unless otherwise stated in the course listings. Comparative Literature 1, 2, 3, or 4 or Native American Studies 5 may normally be substituted for English 3 or University Writing Program 1.

Courses in English (ENL)

Lower Division Courses

3. Introduction to Literature (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. Introductory study of several genres of English literature, emphasizing both analysis of particular works and the range of forms and styles in English prose and poetry. Frequent writing assignments will be made. GE credit: ArtHum, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).—I, II, III. (I, II, III.)

4. Critical Inquiry and Literature: Freshman Seminar (4)
Seminar—4 hours. Prerequisite: completion of Subject A requirement and consent of instructor; enrollment limited to freshmen. Critical inquiry into significant literary texts. Emphasis on close reading, classroom dialogue, and the writing of several papers or a longer seminar paper. GE credit: ArtHum, Wrt.

5F. Introduction to Creative Writing: Fiction (4)
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing fiction. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination. GE credit: Wrt.—I, II, III. (I, II, III.)

5P. Introduction to Creative Writing: Poetry (4)
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing poetry. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.—I, II, III. (I, II, III.)

10A. Literatures in English I: To 1700 (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or equivalent. Historical introduction to English language and literature from 800-1700. Linguistic borrowing, innovation, and change. Emergence of key literary genres. Colonial America as a new site of English literary production and consumption. GE Credit: Wrt.—I, II, III. (I, II, III.)

10B. Literatures in English II: 1700-1900 (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 10A. Historical introduction to English language and literature from 1700-1900. Linguistic borrowing, innovation, colonization, and change. Emergence and development of key literary genres. America, Britain, Ireland, Scotland, and India as important sites of English literary production and consumption. GE Credit: Wrt.—I, II, III. (I, II, III.)

10C. Literatures in English III: 1900 to Present (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 10B. Historical introduction to English language and literature from 1900–present. Linguistic borrowing, innovation, and change. Emergence and development of key literary genres. Formal experimentation. Modernism as transnational phenomenon. GE Credit: Wrt.—I, II, III. (I, II, III.)

30A. Survey of American Literature (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. American literature from the seventeenth century to 1865. GE credit: ArtHum, Div, Wrt.

30B. Survey of American Literature (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. American literature from 1865 to the present. GE credit: ArtHum, Div, Wrt.

40. Introductory Topics in Literature (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or equivalent. Study of a special topic. Literature written in English in any period or place or genre. Thematic, formal, or temporal focus. May be repeated two times for credit if content differs. GE Credit: Wrt.—II.

42. Approaches to Reading (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Close reading and interpretation of literature from a variety of traditional and contemporary approaches. Topics include textual and historical approaches; new criticism; formalism; psychological criticism; feminism and gender; reader-response; materialist approaches. Frequent written assignments. GE credit: Wrt.

43. Introductory Topics in Drama (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or equivalent. Close reading of selected works of British and American drama. Range of historical periods. Focused on a topic. Frequent written assignments. GE Credit: Wrt.—I.

44. Introductory Topics in Fiction (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or equivalent. Close reading of British and American Fiction. Short stories, novellas, novels. Focused on a topic. Frequent written exercises. GE Credit: Wrt.—III.

45. Introductory Topics in Poetry (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1 or equivalent. Close reading of selections from English and American poetry. Focused on a topic. Frequent written exercises. GE Credit: Wrt.—II.

46A. Masterpieces of English Literature (4)
Lecture—3 hours; discussion—I hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Selected works of principal writers to 1640. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. GE credit: Wrt.

46B. Masterpieces of English Literature (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Selected works of principal writers from 1640 to 1832. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. GE credit: Wrt.

46C. Masterpieces of English Literature (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Selected works of principal writers from 1832 to present. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. GE credit: Wrt.

92. Internship in English (1-12)
Internship—3-36 hours. Prerequisite: course 3 or University Writing Program 1. Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: course 3 or University Writing Program 1. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

100F. Creative Writing: Fiction (4)
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5F or 5P, or consent of instructor; priority given to English (Creative Writing) majors. Writing of fiction. May be repeated for credit with consent of instructor. No final examination.—I, II, III. (I, II, III.)

100FA. Creative Writing Advanced Fiction (4)
Discussion—4 hours. Prerequisite: course 100F. Development and evaluation of students' work in prose, primarily in the workshop format. Some reading and discussion of published novels and short stories. Conferences with individual students once per quarter. Priority to English majors. Admission by application only.—III.

100NF. Creative Writing: Non-Fiction (4)
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 3 or University Writing Program 1, or consent of instructor; priority given to English (Creative Writing) majors. Writing of non-fiction. May be repeated for credit with consent of instructor. No final examination.—I.

100P. Creative Writing: Poetry (4)
Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 5F or 5P, or consent of instructor; priority given to English (Creative Writing) majors. Writing of poetry. May be repeated for credit with consent of instructor. No final examination.—II., III.

100PA. Creative Writing Advanced Poetry (4)
Discussion—4 hours. Prerequisite: course 100P. Development and evaluation of students' work in poetry, primarily in the workshop format. Some reading and discussion of published works of poetry. Conferences with individual students once per quarter. Priority to English majors. Admission by application only.—III.

105. History of the English Language (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. History of the English language. Examination of the language as recorded from Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. GE credit: ArtHum, Wrt.

106. English Grammar (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or Linguistics 1 or consent of instructor. Survey of present day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers, their development, and their usefulness in describing the conventions of English. (Same course as Linguistics 106.) Not open for credit to students who have completed Linguistics 104. GE credit: ArtHum.

106P. English Grammar Practicum (2)
Discussion—2 hours. Prerequisite: course 106/Linguistics 106 (may be taken concurrently). Practice in teaching the principles of grammar to the kinds of audiences teachers encounter in California. Discussions with teachers who teach in these areas. Examination of pedagogical research on teaching grammar. (P/NP grading only.)

107. Freedom of Expression (4)
Lecture—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historical development of fundamental issues and contemporary controversies about freedom of expression, with emphasis on literary and artistic censorship. Not open for credit to students who have

completed Rhetoric and Communication 125 or Communication 107. (Former course Rhetoric and Communication 125.) GE credit: ArtHum, Wrt.—III.

110A. Introduction to Literary Theory (4)
Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Key theoretical terms, concepts, and thinkers from the Greeks to the modern era. GE credit: Wrt.—I, II, III.

110B. Introduction to Modern Literary and Critical Theory (4)
Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Key terms, concepts, and thinkers in the modern era.—I, II, III.

111. Topics in Medieval Literature (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused intensive examination of selected topics in Medieval British literature. May be repeated one time for credit when topic differs. GE credit: ArtHum, Wrt.—III.

113A. Chaucer: Troilus and the "Minor" Poems (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Development of the poet's artistry and ideas from his first work to his masterpiece, "Troilus and Criseyde." GE credit: ArtHum, Wrt.—II.

113B. Chaucer: The Canterbury Tales (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Literary analysis of the complete "Canterbury Tales." Courtly love, literary forms, medieval science and astrology, theology and dogma as they inform the reading of Chaucer's work. GE credit: ArtHum, Wrt.—I.

115. Topics in Sixteenth and Seventeenth Century Literature (4)
Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Historically, generically, or thematically focused study of works of the sixteenth or seventeenth centuries. May be repeated for credit when content differs. GE credit: Wrt.—I.

117. Shakespeare (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Historically, generically, or thematically focused study of Shakespeare's works. May be repeated two times for credit. GE Credit: ArtHum, Wrt.—I, II, III.

122. Milton (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Selected major works, including Paradise Lost. GE credit: Wrt.—III.

123. 18th-Century British Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of 18th-century English literature. May be repeated for credit when content differs. GE credit: Wrt.—III.

125. Topics in Irish Literature (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Study of emergence, invention, and re-invention of Irish literature. GE Credit: Div, Wrt.—II.

130. British Romantic Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of works of Romantic English literature. May be repeated for credit when content differs. GE credit: Wrt.—I, II.

133. 19th-Century British Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of works of 19th-century English literature. May be repeated for credit when content differs. GE credit: Wrt.—III.

137N. British Literature, 1900-1945 (4)
Lecture—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of works of British literature (drama, poetry, prose fiction) from the period between 1900 and the end of World War II. May be repeated two times for credit when topic differs. Only 2 units of credit to students who have completed course 137. GE credit: Wrt.—III.

138. British Literature: 1945 to Present (4)
Lecture—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of works of British literature (drama, poetry, prose fiction) from the period between 1945 and the present. May be repeated two times for credit when topic differs. Only 2 units of credit to students who have completed course 137. GE credit: Wrt.

139. Topics in Global Literatures and Cultures (4)
Lecture—3 hours; extensive writing or discussion. Prerequisite: course 3 or University Writing Program 1 or equivalent. Historically or thematically organized study of Anglophone literature at the global scale. Possible emphases: globalization of English and its literatures; the history of "world literature"; literatures of British imperialism; questions of translation. May be repeated two times for credit when content differs. GE credit: ArtHum, Div, Wrt.—II.

140. Topics in Postcolonial Literatures and Cultures (4)
Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Study of postcolonial literature of Anglophone colonies. Specific emphases may include literature from and about Anglophone India, the Caribbean, the Middle East, South Asia, Africa, and/or South America. May be repeated two times for credit when topic differs. GE credit: Div, Wrt.—II, III.

141. Topics in Postcolonial Literatures and Migration (4)
Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Study of literatures, histories, and cultures of one or more diasporic groups. May be repeated for credit when topic differs. GE credit: Div, Wrt.

142. Early American Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of American literature of the 17th and 18th centuries. May be repeated for credit when content differs. GE credit: Wrt.—II.

143. 19th-Century American Literature to the Civil War (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of works of 19th-century American literature. May be repeated for credit when content differs. GE credit: Wrt.—I, II.

144. Post-Civil War American Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of works of post-Civil War American literature. May be repeated for credit when content differs. GE credit: Wrt.

146N. American Literature: 1900-1945 (4)
Lecture—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of American literature (drama, poetry, prose fiction) from the period between 1900 and the end of World War II. May be repeated two times for credit when topic differs. Only 2 units of credit to students who have completed course 146. GE credit: Wrt.

147. American Literature, 1945 to the Present (4)
Lecture—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused study of American literature (drama, poetry, prose fiction) from the period between 1945 and the present. May be repeated two times for credit when topic differs. Only 2 units of credit to students who have completed course 146. GE credit: Wrt.—I, II.

149. Topics in Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Intensive examination of literature considered in topical terms, not necessarily historically. May be repeated for credit when content differs. GE credit: Wrt.—I, II.

150A. British Drama to 1800 (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of works of English drama prior to 1800. May be repeated for credit when content differs. GE credit: Wrt.—III.

150B. Drama from 1800 to the Present (4)
Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically focused study of works of anglophone drama from 1800 to the present. May be repeated for credit when topic differs. GE credit: Wrt.—II.

153. Topics in Drama (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historical or thematic study of drama. May be repeated for credit when topic differs. GE credit: Wrt.

155A. 18th-Century British Novel (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically organized examination of the 18th-century British novel, with particular emphasis on its evolution, including the epistolary novel, the picaresque novel, and the Gothic novel: Richardson, Fielding, Sterne, Austen. GE credit: Wrt.—I.

155B. 19th-Century British Novel (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically organized examination of 19th-century British novelists, with emphasis on the historical novel, the social novel, and novels by women: Scott, Dickens, the Brontes, Eliot, Hardy. GE credit: Wrt.—I.

155C. 20th-Century British Novel (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically organized examination of the 20th-century British novel, with emphasis on impressionism; the revolt against naturalism; the experimental novel; the anti-modernist reaction: Conrad, Joyce, Woolf, Lawrence, Drabble, Rhys. GE credit: Wrt.

156. The Short Story (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. The short story as a genre; its historical development, techniques, and formal character as a literary form. European as well as American writers. GE credit: ArtHum, Wrt.—II, III.

158A. The American Novel to 1900 (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically organized examination of the rise and development of the American novel from its beginnings; Hawthorne, Melville, Twain, James, and others. GE credit: Wrt.

158B. The American Novel from 1900 to the Present (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Historically or thematically organized

examination of American novelists of the twentieth century; Faulkner, Hemingway, Fitzgerald, Morrison, and others. GE credit: Wrt.—I.

159. Topics in the Novel (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Examination of major novels arranged thematically. Topics might include Bildungsroman, stream-of-consciousness novel, Gothic novel, historical novel. May be repeated for credit when topic differs. GE credit: Wrt.—III.

160. Film as Narrative (4)
Lecture—3 hours; film viewing: 3 hours. Prerequisite: course 3 or University Writing Program 1. A study of modern film (1930 to present) as a storytelling medium. Offered in alternate years. GE credit: ArtHum, Wrt.—I.

161A. Film History I: Origins to 1945 (4)
Lecture—3 hours; film viewing—3 hours. Prerequisite: course 3 or University Writing Program 1. Cultural and aesthetic history of filmmaking from its origins in the 1890's through 1945. (Courses 161A and 161B need not be taken in sequence.) Offered in alternate years. GE credit: ArtHum, Wrt.—III.

161B. Film History II: 1945 to present (4)
Lecture—3 hours; film viewing—3 hours. Prerequisite: course 3 or University Writing Program 1. Cultural and aesthetic history of filmmaking from 1945 through the present. (Courses 161A and 161B need not be taken in sequence.) Offered in alternate years. GE credit: ArtHum, Wrt.

162. Film Theory and Criticism (4)
Laboratory—3 hours; discussion—2 hours; lecture—1 hour. Prerequisite: course 3 or University Writing Program 1. Film theory and criticism, with a study of ten major works of international film art. Offered in alternate years. GE credit: ArtHum, Wrt.

164. Writing Science (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or Science and Technology Studies 1, or equivalent. Texts and writing practices in the production of scientific knowledge. Surveys the literary structure of scientific arguments; history of scientific genres; rhetoric and semiotics in scientific culture; graphical systems in the experimental laboratory; narratives of science, including science fiction. (Same course as Science & Technology Studies 164.) GE Credit: Wrt.—II. Milburn

165. Topics in Poetry (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 and course 45. Intensive examination of various topics expressed in poetry from all periods of English and American literature. May be repeated for credit when topic covers different poets and poems. GE credit: Wrt.

166. Love and Desire in Contemporary American Poetry (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Close reading of contemporary American poems on the theme of love and desire by poets of diverse ethnicities and of gay, lesbian, and heterosexual orientations. Offered in alternate years. GE credit: Div, Wrt.—III.

167. Twentieth-Century African American Poetry (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1 or the equivalent. Twentieth-century African American poetry, including oral and literary traditions. Authors covered may include Gwendolyn Brooks, Countee Cullen, Robert Hayden, and Langston Hughes. GE credit: Div, Wrt.

168. 20th Century American Poetry (4)
Lecture—3 hours; extensive writing. Prerequisite: course 3 or University Writing Program 1. Historical Study of American poetry since 1900, with thematic and formal focus at the instructor's discretion. May be repeated two times for credit if content differs. GE credit: Wrt.—III.

171A. The Bible as Literature: The Old Testament (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. May be taken independently of course 171B. Selected readings from the Old Testament illustrating various literary forms. Emphasis on the Pentateuch, the Historical Books, and the Wisdom Books. GE credit: ArtHum, Div, Wrt.

171B. The Bible as Literature: Prophets and New Testament (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. May be taken independently of course 171A. Selected readings from the Old Testament prophets and the New Testament. GE credit: ArtHum, Div, Wrt.

173. Science Fiction (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or Science and Technology Studies 1, or equivalent. The literary modes and methods of science fiction. Representative texts, authors, and themes of the genre—e.g., time travel, alternative universes, and utopias. Relations of science fiction to science, philosophy, and culture. (Same course as Science and Technology Studies 173.) GE credit: ArtHum, Wrt.—II.

175. American Literary Humor (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1, or standing above freshman level. American humorous vision of man, nature, and the supernatural. Includes one or more of the following: colonial humor; southwestern and New England humor; pre- and post-Civil War masters; local colorists; journalistic gadflies; anti-provincialists; modernist poets and prose writers; black humor. GE credit: ArtHum, Wrt.

177. Study of an Individual Author (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Survey of the works of an individual author other than Chaucer, Shakespeare, or Milton. May be repeated for credit when a different author is studied. GE credit: Wrt.

178. Topics in Nations, Regions, and Other Cultural Geographies (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Literary productions of a local, regional, national, transnational, or other geographical formation; e.g., the global South; literature of Hawaii; literature of Australia. May be repeated two times for credit. GE credit: Div, Wrt.—III.

179. Topics in Comparative American Literatures (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1 or equivalent. Comparative study of what constitutes "American" literature. Possible emphases: North American or Latin American literature; Pacific Rim or Circum-Atlantic approaches; interrelations among different modes of racialization within and beyond U.S. borders. May be repeated two times for credit when topic differs. GE credit: ArtHum, Div, Wrt.

180. Children's Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historical backgrounds and development of types of children's literature, folklore and oral tradition, levels of interest, criticism and evaluation, illustration and bibliography. GE credit: ArtHum, Wrt.—I.

181A. African American Literature to 1900 (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. African American literature from the colonial period to 1900. Particular attention to the rapid development of the African American literary culture from a primarily oral tradition to various literary genres, including the slave narrative. GE credit: Div, Wrt.

181B. African American Literature 1900-Present (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Major African American writers in the context of cultural history from 1900 to the present. Writers may include Richard Wright, Ann Petry, James Baldwin, Ralph Ellison, Paule Marshall, Toni Morrison, Alice Walker, Clarence Major. GE credit: Div, Wrt.

182. Literature of California (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. California literature in the context of California's social, political, and intellectual history. Reading of poetry, fiction, and essays. Emphasis on nineteenth- and twentieth-century naturalists, turn of the century novelists, the Beats, and writers of the last two decades. GE credit: ArtHum, Div, Wrt.—I.

183. Adolescent Literature (4)
Lecture—3 hours; term paper. Prerequisite: acceptance to the English Department Subject Matter Preparation Program or consent of instructor. The theoretical, critical, and literary complexities that inform the study and teaching of American adolescent literature.

184. Literature and the Environment (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historical and/or thematic survey of topics in writing about the environment. GE credit: ArtHum, Wrt.—II.

185A. Women's Writing I (4)
Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Women's Writing in English before 1800; organized by period, place, genre, or theme. GE credit: Div, Wrt.—I.

185B. Women's Writing II (4)
Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Women's Writing in English from 1800 to 1900; organized by period, place, genre, or theme. GE credit: Div, Wrt.—II.

185C. Women's Writing III (4)
Lecture/discussion—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 3 or University Writing Program 1. Women's Writing in English after 1900; organized by period, place, genre, or theme. GE credit: Div, Wrt.

186. Literature, Sexuality, and Gender (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 3 or University Writing Program 1. Historically or thematically focused intensive examinations of gender and sexuality in British and American literature. May be repeated for credit when content differs. GE credit: Div, Wrt.—I.

187A. Topics in Literature and Media (4)
Seminar—3 hours; film viewing—3 hours. Prerequisite: course 110A or 110B; consent of instructor. Group study of a topic centered on the relationships between literature and film or other moving-image media. GE credit: Wrt.—I, III.

188A. Topics in Literary and Critical Theory (4)
Seminar—3 hours; term paper. Prerequisite: course 110A or 110B; consent of instructor. Intensive examination of theories addressing a particular problem, topic, or question. GE credit: Wrt.—I.

189. Seminar in a Major Writer (4)
Seminar—3 hours; term paper. Prerequisite: junior or senior standing; a major in English or consent of instructor. One major writer's artistic development with attention to intellectual and literary milieu. Limited enrollment. GE credit: Wrt.—II, III.

192. Internship in English (1-12)
Internship—3-36 hours. Prerequisite: course 3 or University Writing Program 1. Internships in fields where students can practice their skills. A maximum of four units is allowed toward the major in English. May be repeated for credit for a total of 12 units. (P/NP grading only.)

194H. Seminar for Honors Students (4)
Seminar—3 hours; term paper. Prerequisite: course 110A or 110B; one advanced study course; admission to English Department Senior Honors Program in Literature, Criticism, and Theory. Preparation for writing an honors thesis in course 195H. Limited enrollment; high level of participation expected.—II. (II.)

195H. Honors Thesis (4)
Independent study—12 hours. Prerequisite: course 194H. Preparation of a thesis, under the supervision of an instructor. Students satisfying requirements for the general major or the teaching emphasis write on a scholarly or critical subject; creative writing students submit a volume of poems or fiction.

197T. Tutoring in English (1-5)
Tutoring—1-5 hours. Prerequisite: upper division standing and consent of Chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. Does not fulfill requirement for major. May be repeated for credit for a total of 8 units. (P/NP grading only.)

197TC. Community Tutoring in English (1-4)
Tutoring—1-4 hours. Prerequisite: upper division standing and a major in English; consent of chairperson. Field experience, with individuals or in classroom in instruction of English language, literature, and composition. Does not fulfill requirement for major. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: one course from English 3, 5F, 5P or University Writing Program 1. (P/NP grading only.)

198S. Directed Group Study (4)
Lecture/discussion—4 hours. Prerequisite: course 163S concurrently. Group study will be closely tied to the texts and periods studied in course 163S. Investigations of historical sites, museums, galleries, and performances. To be taught in London. (P/NP grading only.)—III. (III.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

200. Introduction to Graduate Studies in English (4)
Seminar—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing. Introduction to literary scholarship with special attention to the elements of professionalism and to different modes of literary investigation. (S/U grading only.)—I. (I.)

205. Anglo-Saxon Language and Culture (4)
Lecture—3 hours; conference and term paper. The language and culture of Anglo-Saxon England; readings in Old English prose and poetry.

206. Beowulf (4)
Discussion—3 hours; oral and written reports; conferences with students. Prerequisite: course 205 or the equivalent. A study of the poem and the Heroic Age of Germanic literature.

207. Middle English (4)
Discussion—3 hours; term paper. Study of the phonology, morphology, syntax, and lexicon between 1100 and 1500 with investigation of the regional dialects; pertinent facts on both the internal and external linguistic history; intensive reading of texts.

210. Readings in English and American Literature (4)
Seminar—3 hours; conference—1 hour. Prerequisite: upper division course in area studied. Content varies according to specialty of instructor. May be repeated if topic differs.

225. Topics in Irish Literature (4)
Seminar—3 hours; conference—1 hour. Prerequisite: graduate standing. Varied topics, including the nineteenth-century novel, contemporary Irish poetry, rise of the drama, or a study of a major author. May be repeated for credit if topic differs.

230. Study of a Major Writer (4)
Seminar—3 hours; conferences with individual students—1 hour; research papers. Artistic development of one major writer and his intellectual and literary milieu. May be repeated for credit when a different writer is studied.

232. Problems in English Literature (4)
Seminar—3 hours; conferences with individual students—1 hour. Selected issues in the current study and critical assessment of a limited period or topic in English literature. May be repeated for credit when different period or topic is studied.

233. Problems in American Literature (4)
Seminar—3 hours; conferences with individual students—1 hour; research papers. Selected topics for intensive investigation. May be repeated for credit when different topic or period is studied.—I, III.

234. Dramatic Literature (4)
Lecture—3 hours; conference—1 hour. Historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy. May be repeated for credit if topic differs.

235. Theory of Fiction (4)
Seminar—3 hours; conference—1 hour. Prerequisite: graduate standing. Theories of fiction as they relate to the professional writer's practice of the craft. For students in the Creative Writing Program. May be repeated for credit when focus differs.

236. Poetics (4)
Seminar—3 hours; conference—1 hour. Prerequisite: graduate standing. Theories of poetry as revealed in structure, prosody, and idiom of British and American poems, variably approached—through intensive study of a single poet, historically, or theoretically—at the instructor's discretion. For students in the Creative Writing Program. May be repeated for credit when focus differs.—II.

238. Special Topics in Literary Theory (4)
Seminar—3 hours; term paper. Prerequisite: course 237 or the equivalent. Advanced topics in literary theory and criticism. Preparation and evaluation of research paper. May be repeated for credit when topic and/or reading list differs. Offered in alternate years.—II, III.

240. Medieval Literature (4)
Seminar—3 hours; conference—1 hour. Studies of Medieval literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.—I, III.

242. Sixteenth-Century Literature (4)
Seminar—3 hours; conference—1 hour. Studies in sixteenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

244. Shakespeare (4)
Seminar—3 hours; conference—1 hour. Studies in Shakespeare. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.—I.

246. Seventeenth-Century Literature (4)
Seminar—3 hours; conference—1 hour. Studies in seventeenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.—III.

248. Eighteenth-Century Literature (4)
Seminar—3 hours; conference—1 hour. Studies in eighteenth-century literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.—II.

250. Romantic Literature (4)
Seminar—3 hours; conference—1 hour. Studies in Romantic literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.—I.

252. Victorian Literature (4)
Seminar—3 hours; conference—1 hour. Studies in Victorian literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.—II, III.

254. Twentieth-Century British Literature (4)
Seminar—3 hours; conference—1 hour. Studies in twentieth-century British literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.—III.

256. Early American Literature (4)
Seminar—3 hours; conference—1 hour. Studies in Early American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.—II.

258. American Literature: 1800 to the Civil War (4)
Seminar—3 hours; conference—1 hour. Studies in American literature from 1800 to Civil War. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

260. American Literature: Civil War to 1914 (4)
Seminar—3 hours; conference—1 hour. Studies in American literature from the Civil War to 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.—II.

262. American Literature after 1914 (4)
Seminar—3 hours; conference—1 hour. Studies in American literature after 1914. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.—I, II.

264. Studies in Modern British and American Literature (4)
Seminar—3 hours; conference—1 hour. Studies in modern British and American literature. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when a different topic is studied.

270. Studies in Contemporary World Literature (4)
Seminar—3 hours; conference—1 hour. Prerequisite: graduate standing, consent of instructor, with preference given to those enrolled in the masters program in Creative Writing. Emerging global, international or transnational techniques, theories, and individual works of contemporary world prose or poetry. Discussion, seminar reports, research papers. May be repeated for credit when topic differs.

285. Literature by Women (4)
Seminar—3 hours; conference—1 hour. Studies in literature by women and the theoretical approaches to literature by women. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when topic and/or reading list differs.

287. Topics in Literature and Media (4)
Seminar—3 hours; film viewing—3 hours. Prerequisite: graduate standing. Study of a topic centered on film or other moving-image media. Course materials to be selected by the instructor. Preparation and evaluation of research papers. May be repeated for credit when topic differs.

290F. Seminar in Creative Writing of Fiction (4)
Seminar—3 hours; 1 additional hour of writing. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of prose. Evaluation of written materials and individual student conferences. May be repeated for credit.—I, II, III. (I, II, III.)

290NF. Seminar in Creative Writing of Non-Fiction (4)
Seminar—3 hours; term paper. Prerequisite: consent of instructor, graduate standing, preference given to those enrolled in the master's program in Creative Writing. The writing of literary non-fiction, with emphasis on autobiography, biography, memoir, the occasional or nature essay, or other non-fiction prose narratives. May be repeated for credit.—II.

290P. Seminar in Creative Writing of Poetry (4)
Seminar—3 hours; 1 additional hour of writing. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of poetry. Evaluation of written materials and individual student conferences. May be repeated for credit.—I, II, III. (I, II, III.)

298. Directed Group Study (1-5)
(S/U grading only.)

299. Individual Study (1-12)
(S/U grading only.)

299D. Special Study for the Doctoral Dissertation (1-12)
(S/U grading only.)

Professional Courses

391. Teaching Creative Writing (2)
Discussion—2 hours. Prerequisite: graduate standing; appointment as Teaching Assistant in the English. Designed for new instructors of English 5F or 5P; discussion of ways to facilitate creative writing workshops and to respond to student manuscripts. (S/U grading only.)—III. (III.)

393. Teaching Literature and Composition (2)
Discussion—2 hours. Prerequisite: graduate standing; appointment as Teaching Assistant in the English Department. Designed for new instructors of English 3 or the equivalent courses; discussion of problems related to teaching literature and composition to lower division students. (S/U grading only.)—III. (III.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Entomology

(College of Agricultural and Environmental Sciences)

Michael P. Parrella, Ph.D., Professor, Chairperson of the Department

Lynn S. Kimsey, Ph.D., Vice Chairperson

Department Office. 367 Briggs Hall
(530) 752-0475; http://entomology.ucdavis.edu

Faculty

James R. Carey, Ph.D., Professor
Peter S. Cranston, Ph.D., Professor
Penelope J. Gullan, Ph.D., Professor
Bruce D. Hammock, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Richard Karban, Ph.D., Professor
Harry K. Kaya, Ph.D., Professor (Entomology, Nematology)
Lynn S. Kimsey, Ph.D., Professor
Sharon P. Lawler, Ph.D., Professor
Walter S. Leal, Ph.D., Professor
Edwin Lewis, Ph.D., Professor *(Entomology, Nematology)*
Fumio Matsumura, Ph.D., Professor *(Entomology, Environmental Toxicology)*
Michael P. Parrella, Ph.D., Professor (Entomology, Plant Sciences)
Jay A. Rosenheim, Ph.D., Professor
Thomas W. Scott, Ph.D., Professor
Diane E. Ullman, Ph.D., Professor
Philip S. Ward, Ph.D., Professor
Neal M. Williams, Ph.D., Assistant Professor
Louie H. Yang, Ph.D., Assistant Professor
Frank G. Zalom, Ph.D., Professor

Emeriti Faculty

Oscar G. Bacon, Ph.D., Professor Emeritus
Hugh Dingle, Ph.D., Professor Emeritus
John D. Edman, Ph.D., Professor Emeritus
Lester E. Ehler, Ph.D., Professor
Bruce F. Eldridge, Ph.D., Professor Emeritus
Norman E. Gary, Ph.D., Professor Emeritus
Jeffrey Granett, Ph.D., Professor
Albert A. Grigarick, Jr., Ph.D., Professor Emeritus
Charles L. Judson, Ph.D., Professor Emeritus
Donald L. McLean, Ph.D., Professor Emeritus
Robert E. Page Jr., Ph.D., Professor Emeritus
Christine Y. S. Peng, Ph.D., Professor Emeritus
Richard E. Rice, Ph.D., Lecturer Emeritus
Robbin W. Thorp, Ph.D., Professor Emeritus
Robert K. Washino, Ph.D., Professor Emeritus

Affiliated Faculty

Anthony Cornel, Ph.D., AES Entomologist
Mary L. Flint, Ph.D., Specialist in Cooperative Extension
Larry Godfrey, Ph.D., Specialist in Cooperative Extension, AES Entomologist
Robert Kimsey, Ph.D. Lecturer
Eric C. Mussen, Ph.D., Specialist in Cooperative Extension

The Major Program

The Entomology major is a general biological science program. The curriculum is designed to develop an understanding of fundamental biological concepts by studying insects. Insects offer unique opportunities to study biological systems and are model experimental animals. Many insects are either pests, or beneficial species that have great importance to the economy, environment or public health. Students may focus on specific areas of interest including agricultural entomology, insect systematics and evolution; behavior and ecology; medical entomology; and insect molecular biology, physiology and toxicology.

The Program. Students begin their study in entomology with selected insect biology courses. After completing these courses, students may enroll in courses in their particular area of interest. A student interested in applied entomology, for example, could enroll in courses such as arthropod pest management and biological control.

Career Alternatives. Entomology graduates find careers in many different areas of applied or basic biology. Graduates have the opportunity to continue in professional graduate programs such as veterinary or human medicine, or get advanced degrees leading to careers in biotechnology, conservation biology, or academic teaching and research. Many graduates have participated in internship programs with the California Department of Food and Agriculture and found careers in insect diagnostic laboratories, conducting insect surveys, and/or developing entomological collections. Other graduates have worked in agriculture in the area of insect pest management. Graduates are prepared for managerial and technical positions with state and federal agencies and in agricultural production and supporting industries. Some entomology graduates pursue careers in primary, secondary, and college level science education.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 45-47
Biological Sciences 1A, 1B, 1C; or 2A, 2B, 2C 14-15
Chemistry 2A, 2B, 8A, 8B 16
Mathematics 16A 3
Physics 1A, 1B 6
Statistics 13, 32, or Plant Sciences 120 3-4
Plant Sciences 21, Engineering 5, or Mathematics 16B 3

Depth Subject Matter 34-40
Microbiology 102, Plant Biology 118, 148, Plant Pathology 120 or Pathology, Microbiology, and Immunology 128 3-5
Biological Sciences 101 4
Environmental Science and Policy 100 or Evolution and Ecology 101 4
Evolution and Ecology 100 4
Biological Sciences 102 and 103 or Animal Biology 102 and 103 6-10
Entomology 100, 100L 6
At least 7 units from Entomology 102, 103, 104, 107, 109, or 116 7

Restricted Electives 34
Upper division entomology courses 14
Upper division electives related to student's interest with approval of adviser 20
Note: No more than a total of 6 units from Entomology 192, 197T and 199 may count toward fulfilling depth subject matter or restricted elective units.

Total Units for the Major 114-121

Major Adviser. S. Lawler

Minor Program Requirements:

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

UNITS

Insect Biology 19-23
Entomology 100, 100L 6
At least seven units from Entomology 102, 103, 104, 107, 109 7
At least two additional upper division Entomology courses (except courses 192, 198, 199) 6-10

Agricultural Pest Management 21-23
Entomology 100, 100L, 110, 135 15
At least two courses from Nematology 100, Plant Sciences 176, Plant Pathology 120 6-8

Insect Ecology and Evolution 20
Entomology 100, 100L, 104 9
At least seven units from Entomology 103, 107, 109, 116, 158 7
Evolution and Ecology 149 or Environmental Science and Policy 121 4

Medical-Veterinary Entomology 19
Entomology 100, 100L, 104, 153, 156 15
At least four units from Entomology 156L, 158; Pathology, Microbiology, and Immunology 126, 126L, 128 4

Forensic Entomology 22
Entomology 100, 100L, 102, 158 13
Biological Science 1A 5
Evolution and Ecology 104 4

Minor Adviser. S. Lawler

Graduate Study. The Department of Entomology offers a program of study and research leading to the M.S. and Ph.D. degrees. See Graduate Studies, on page 109 and the Graduate Announcement, for further details.

Graduate Advisers. See the *Class Schedule and Registration Guide*.

Related Courses. See courses in Nematology.

Courses in Entomology (ENT)

Lower Division Courses

1. Art, Science and the World of Insects (3)
Lecture—3 hours; laboratory—3 hours. Fusion of entomology and art to create an appreciation of insect biology, ecology, interactions with humans and importance in human culture. Multidisciplinary approaches in education and career paths in entomology and art. GE credit: ArtHum or SciEng.—I. (I.) Ullman

2. Biodiversity (3)
Lecture—2 hours; lecture/discussion—1 hour. Introduction to nature, scope and geographical distribution of biodiversity (the diversity of life, with emphasis on plants and animals, especially insects). Humans and biodiversity—domestication, aesthetics, ethics and valuation. Species richness and "success." Biodiversity through time; monitoring, evaluation and conservation. Biomes—global, continental and Californian. (Same course as Evolution and Ecology 2.) GE credit: SciEng, Wrt.—I. (I.)

10. Natural History of Insects (3)
Lecture—3 hours. Designed for students not specializing in entomology. Not open for credit to students who have had course 100, but students who have taken this course may take course 100 for credit. An introduction to the insects detailing their great variety, structures and functions, habits, and their significance in relation to plants and animals including man. GE credit: SciEng.—II. (II.) Kaya, Ullman

50. Insects in the Environment (3)
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course/Evolution and Ecology 2 or course 10 or Biological Sciences 1B or consent of instructor. Ecological roles of insects in different habitats and environmental systems. The uses of insects in terrestrial and aquatic surveys and environmental monitoring. Field and laboratory research, data analysis and scientific writing.—III. (III.)

90X. Special Topics in Entomology (2)
Seminar—2 hours. Freshman seminar course for in-depth examination of a special topic within the subject area. May be repeated two times for credit. (P/NP grading only.)—I, II, III.

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Work-learn experience on and off campus in all subject areas offered by the department, supervised by a member of the faculty. May be repeated up to 12 units of credit. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

100. General Entomology (4)
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 1B. Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare. GE credit: SciEng, Wrt.—I, III. (I, III.) Kimsey

100L. General Entomology Laboratory (2)
Laboratory—6 hours. Prerequisite: course 100 (may be taken concurrently). Anatomy, development, population ecology, methods of collecting, classification and identification of insects of all orders and of major families. GE credit with concurrent enrollment in course 100: Wrt.—I. (I.) Kimsey

101. Functional Insect Morphology (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100. Study of the basic external and internal structures, organs and tissues of insects, with emphasis on functional systems. Functional anatomy, histology and fine structures of important organs and tissues will be discussed. GE credit: SciEng.—II. (II.) Kimsey

102. Insect Physiology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or course in physiology or invertebrate zoology. Processes by which insects maintain themselves, reproduce, and adapt to environment. Insects as models for basic/applied research through detailed analysis of metabolic, physiological, and behavioral processes. Emphasis on analysis of methodology, fact, and theory. GE credit: SciEng.—II. (II.) Hammock, Leal

103. Insect Systematics (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: introductory course in zoology or entomology. Principles and methods of systematics, with particular reference to insects. Emphasis on different theories of classification, and analysis of phylogenetic relationships. Offered in alternate years. GE credit: SciEng, Wrt.—III.

104. Behavioral Ecology of Insects (3)
Lecture—3 hours. Prerequisite: introductory biology or zoology. Basic principles and mechanisms of insect behavior and ecology. An evolutionary approach to understanding behavioral ecology of insects. GE credit: SciEng.—II. (II.) Lewis

107. California Insect Diversity (5)
Lecture—1 hour; laboratory—6 hours; fieldwork—6 hours. Prerequisite: an introductory course in entomology. Survey of the diversity of insects from selected ecological zones in California with emphasis on collection, identification, and natural history. Offered in alternate years. GE credit: SciEng, Wrt.—III. Ward

109. Field Taxonomy and Ecology (7)
Lecture—2 hours; laboratory—36 hours; five-week course. Prerequisite: an introductory course in entomology or consent of instructor. The study of insects in their natural habitats; their identification and ecology. Offered in alternate years. GE credit: SciEng, Wrt.—(IV.) Ward

110. Arthropod Pest Management (5)
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Science 1B. Development of the ecological basis for the integrated pest management paradigm with emphasis on agriculture. Ecological and practical aspects of control tactics. Laboratory emphasizes identification of pests and beneficials of agriculture and urban situations. GE credit: SciEng, Wrt.—II. (II.) Zalom

116. Freshwater Macroinvertebrates (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 2B or equivalent. Biology, ecology and taxonomy of freshwater macroinvertebrates, including insects, crustaceans, molluscs, worms, leeches, flatworms and others. Adaptations to life in freshwater. Aquatic food webs. Uses of macroinvertebrates in water quality monitoring. Field trips during regular lab hours. Limited enrollment.—III. (III.) Lawler

116L. Aquatic Insect Collection (2)
Laboratory—4 hours; field work—2 hours. Prerequisite: high school biology recommended. Students will learn to collect aquatic insects and to identify them to Family and Genus levels. Collections will require two, one-day weekend field trips (by arrangement). Collection requirement is 40 Families, with 20 identified to Genus level. Limited enrollment. May not be taken for credit if students have completed the 5-unit option for Entomology 116.—III. (III.) Lawler

117. Longevity (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods. (Same course as Human Development 117.) GE credit: SciEng, Wrt.—I. Carey

119. Apiculture (3)
Lecture—3 hours; papers. Prerequisite: Biological Sciences 1C recommended. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities. GE credit: SciEng, Wrt.—III. (III.)

123. Plant-Virus-Vector Interaction (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1C, 101; Plant Biology 105, Plant Pathology 120, and course 100 recommended. Analysis of the interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern experimental approaches to the interdiction of viral movement. Offered alternate years. (Same course as Plant Biology 123/Plant Pathology 123.)—(I.) Lucas, Gilbertson, Ullman

135. Introduction to Biological Control (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or 110. Principles of biological control of arthropod pests and weeds. Biology of pathogens, entomopathogenic nematodes, parasitoids, and predators. Implementation in classical and augmentative biological control. Role of biological control in pest management. Offered in alternate years—I. Kaya, Parrella

153. Medical Entomology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, upper division standing in one of the biological sciences, or consent of instructor. Basic biology and classification of medically important arthropods with special emphasis on the ecology of arthropod-borne diseases and principles of their control. Relationships of arthropods to human health. GE credit: SciEng, Wrt.—II. (II.) Scott

156. Biology of Parasitism (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of instructors. Lectures on the biological and ecological aspects affecting host-parasite relationships using selected examples from protozoan and metazoan fauna. GE credit: SciEng.—III. (III.) Kimsey, Theis, Nadler

156L. Biology of Parasitism Laboratory (1)
Laboratory—3 hours. Prerequisite: course 156 (concurrently) or consent of instructor. Laboratory demonstrations using selected examples of protozoan and metazoan organisms along with various techniques used in parasitology to exemplify concepts presented in the lecture course. GE credit with concurrent enrollment in course 156: Wrt.—III. (III.) R. Kimsey

158. Forensic Entomology (3)
Lecture—2 hours; laboratory—4 hours. Prerequisite: Biological Sciences 1B or Entomology 100, upper division standing. Arthropods, their general biology, succession, developmental cycles and population biology in matters of criminal prosecution and civil litigation. Emphasis on basic arthropod biology, ecological and developmental concepts and methods, development of reasoning abilities, implication, development of opinions and evidence. GE Credit: SciEng or SocSci, Wrt.—III. (III.) R. Kimsey

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Laboratory experience or fieldwork off and on campus in all subject areas offered in the Department of Entomology. Internships supervised by a member of the faculty. (P/NP grading only.)

197T. Tutoring in Entomology (1-3)
Discussion—1-3 hours. Leading small discussion groups. Preview assignments and prepare guidelines for discussion. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

212. Molecular Biology of Insects and Insect Viruses (3)
Lecture—3 hours. Prerequisite: consent of instructor. A molecular biological analysis of insect systematics, physiology, and defense mechanisms. Molecular biology of insect viruses. Baculovirus expression vectors and post-translation modification of expressed polypeptides. Biological control of using neuropeptides and toxin genes in insect viruses. Offered in alternate years.—II. (II.)

214. Vector-Borne Infectious Diseases: Changing Patterns (2)
Lecture/discussion—2 hours. Vector-borne infectious diseases especially as they relate to changing patterns associated with climatic changes, trade and population movement. (Same course as Population Health and Reproduction 214.)—I. (I.) Chomel

225. Terrestrial Field Ecology (4)
Seminar—1 hour; field work—12 hours. Prerequisite: introductory ecology and introductory statistics or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay, emphasizing student projects. Ecological hypothesis testing, data gathering, analysis and written and oral presentation of results. (Same course as Ecology 225/Population Biology 225.)—III. (III.) Karban

230. Advanced Biological Control (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: graduate or upper division standing in biological science or consent of instructor. Principles and current issues in biological control of arthropod pests and weeds; laboratory devoted to identification and life history of the major groups of parasitic and predaceous arthropods. Offered in alternate years.—(I.)

253. Advanced Medical Entomology (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division course in entomology (other than course 153) and one course in microbiology: course 153 strongly recommended. An analysis of several anthropod-borne human diseases with emphasis on the relationships of the biology of the vector to the ecology of the disease. Discussion includes demonstration of vectors and techniques. Offered in alternate years.—(III.)

290. Exploratory Topics in Entomology (2)
Seminar—2 hours. Interdisciplinary topics in entomology, including innovative applications of entomological concepts to other fields of research and human endeavor (e.g. medicine, technology, art, criminology). May be repeated for up to 8 units of credit when topic differs.—I, II, III.

291. Current Topics in Medical and Veterinary Entomology (2)
Seminar—2 hours. Prerequisite: course 153. Discussion of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in humans and animals. May be repeated one time for credit. Not offered every year.—I, II, III. Kimsey, Scott

292. Current Topics in Insect Physiology and Behavior (2)
Seminar—2 hours. Prerequisite: course 102 if topic is physiology, a course in behavior if topic is behavior, or either if topic bridges both. Analysis of contemporary advances in insect physiology, biochemistry and/or behavior. Interpretation and description of physiological and behavioral mechanisms and functions. Application of general principles to solution of problems in the laboratory and field. May be repeated for up to 8 units of credit if topic differs. Not offered every year.—I, II, III. Hammock, Leal

293N. Current Topics in Insect Biotechnology and Genomics (2)
Seminar—2 hours. Prerequisite: course 212. Discussion of advances in insect biotechnology, including genetic engineering and genomics. May be repeated for up to 6 units of credit if topic differs. Not offered every year.—I, II, III. Hammock, Leal

294. Current Topics in Insect Ecology, Evolution, and Systematics (2)
Seminar—2 hours. Prerequisite: course 103, general course in ecology or evolution. Discussions of advanced topics in ecology, evolution and systematics with emphasis on analysis of factors influencing the distribution, abundance, adaptations and evolutionary relationships of insects. Includes consideration of applications of basic theory (e.g. biological control). May be repeated for credit up to eight units if topics differs. Not offered every year.—I, II, III.

295. Current Topics in Agricultural Entomology and Bee Biology (2)
Seminar—2 hours. Prerequisite: course 110 if topic covers pests and beneficial predators, course 119 if topic is bee biology, or either if topic bridges both. Discussion of advanced topics about the biology, ecology, behavior, and management of pest and beneficial insects. May be repeated for up to 8 units of credit if topic differs. Not offered every year.—I, II, III. Parrella, Rosenheim

297N. Seminar in Entomology (1)
Seminar—1 hour. Weekly entomology seminar. May be repeated up to 9 units of credit if topic differs. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Environmental Biology and Management

This major was discontinued as of Fall 2008; see Environmental Science and Management, on page 289.

(College of Agricultural and Environmental Sciences)

Environmental Geology

(College of Letters and Science)

The minor in Environmental Geology examines the multidisciplinary factors of geology and related earth science fields, and planning and resources oriented programs. Students in the minor are encouraged to participate in internship programs that assist them in solidifying the Environmental Geology minor with their Geology major or other major field areas that include geologic components.

The minor is sponsored by the Department of Geology in 2119 Earth and Physical Sciences Building.

Minor Program Requirements:

	UNITS
Environmental Geology	**22-24**
Geology 130, 134, and Environmental and Resource Sciences 186	9
Soil Science 118	4
Hydrologic Science 141 or Civil and Environmental Engineering 142	3
Two courses chosen from Environmental Science and Policy 160, 171, 179, Geology 135, Hydrologic Science 144, 146	6-8

Minor Adviser. K. Verosub (*Geology*); 3133 Earth and Physical Sciences Building; (530) 752-6911

Environmental Horticulture

(College of Agricultural and Environmental Sciences)

Faculty. See Plant Sciences, on page 461.

The Program. Students of Environmental Horticulture learn how plants improve the environment and the quality of our lives. Plants are used to revegetate and restore disturbed landscapes, control erosion, and reduce energy and water consumption. The ornamental use of plants to improve the aesthetic quality of urban and rural landscapes, recreational areas, and commercial sites is an important aspect of the study of environmental horticulture.

Students interested in Environmental Horticulture can obtain a B.S. degree in Environmental Horticulture and Urban Forestry and may specialize in Floriculture/Nursery Management, Urban Forestry, Landscape Management/Turf or Plant Biodiversity/Restoration. Students can develop an individual major with the help of an Environmental Horticulture faculty adviser and approval of the College's Individual Major Committee. A minor in Environmental Horticulture or Landscape Restoration is available to students in other majors.

Career Alternatives. Opportunities in this field include growing and/or managing plants in a variety of settings, including nurseries, golf courses and arboreta, consulting as an urban, landscape, or restoration horticulturist, business ownership, working for public agencies or private landscape firms/corporations, park management and landscape contracting. Students are encouraged to develop internships on or off campus to augment their activities in the classroom and laboratory.

Minor Program Requirements:

	UNITS
Environmental Horticulture	**23-25**
Environmental Horticulture 6 and 105	8
Plant Sciences 171	4
Select three courses from Environmental Horticulture 100, 120, 125, 130, 133	11-13

Minor Advisers. J.A. Harding or D.W. Burger *(Plant Sciences)*

Related Undergraduate Programs. See the undergraduate majors in Environmental Horticulture and Urban Forestry, on page 287, Agricultural Management and Rangeland Resources, on page 141, Crop Science and Management, on page 208, and Plant Biology, on page 456.

Graduate Study. For graduate study related to this field, see the M.S. and Ph.D. degree programs in the graduate groups of Horticulture and Agronomy, Plant Biology, Ecology, and Genetics. Also see Graduate Studies, on page 109.

Related Courses. See Plant Biology and Plant Sciences.

Courses in Environmental Horticulture (ENH)

Questions pertaining to the following courses should be directed to the instructor or to the Plant Sciences Advising Office in 1224 Plant and Environmental Sciences Building (530) 752-7738.

Lower Division Courses

1. Introduction to Environmental Horticulture/Urban Forestry (3)
Lecture—3 hours. Introduction to the use of plants to enhance the physical, visual and social environment. The use of ecological principles in developing sustainable, low maintenance landscape systems will be presented. Career opportunities will be discussed. GE credit: SciEng, Wrt.—I. (I.) Burger

6. Introduction to Environmental Plants (4)
Lecture—1 hour; discussion—2 hours; laboratory—3 hours. Classification, nomenclature and variation of environmental plants. The use of floral and vegetative characteristics and terminology to key unknown plants. Characteristics of plant groups and basics of climate, soils and plant selection. Identification of 150 common landscape plants.—I. (I.) Young

Upper Division Courses

100. Urban Forestry (4)
Lecture—2 hours; laboratory—3 hours; term paper. Prerequisite: Biological Sciences 1C or Plant Sciences 2. Principles and practices of planning and managing urban vegetation. Basics of tree appraisal, natural resource inventory, and development of long term urban forest management plans.—I. (I.) Harding

101. Trees of the Urban Forest (2)
Lecture—1 hour; laboratory—2 hours. Prerequisite: course 6 or consent of instructor. Identification and evaluation of 200 tree species of the urban forest on campus, in the Arboretum, and in the city of Davis; appraised and aesthetic values, condition, and branch structure; contribution of trees to this ecosystem. Bicycle required.—I. (I.) Harding

102. Physiological Principles in Environmental Horticulture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C. Physiological principles and processes essential to floriculture, nursery crop production, turfculture and landscape horticulture. Emphasis on the control of vegetative and reproductive development for a broad species range in greenhouse and extensive landscape environments.—I. (I.) Burger

105. Taxonomy and Ecology of Environmental Plant Families (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 6 or consent of instructor. Classification and identification of introduced and native species used in urban forests, with emphasis on floral and vegetative characteristics of the prominent families of angiosperms and gymnosperms, adaptations to environmental variations in western landscapes, and horticultural classification.—III. (III.) Harding

120. Management of Container Media (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil Science 10. Principles of soil science and practices related to management of container media are taught, emphasizing appropriate use of soils and amendments, irrigation, and fertilizers. Physical and chemical properties are tested and effects of management on crops are evaluated in the laboratory.—I. (I.) Evans

125. Greenhouse and Nursery Crop Production (5)
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Plant Sciences 2 or Biological Sciences 1C. Principles and techniques for the production of ornamental greenhouse and nursery crops. Hands-on experience producing greenhouse crops. Optional weekend field trip.—II. (II.) Lieth

129. Analysis of Horticultural Problems (4)
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 102, Entomology 110, Plant Pathology 120, and Soil Science 100 or the equivalents. Methods of analysis of common plant disorders seen in the landscape, greenhouse, and nursery. Diagnosis of plant disorders caused by soil, water, insects, disease, chemical agents, climatic conditions or cultural practices. Approaches to diagnosis that emphasize acquisition and integration of information.—III. (III.) Durzan

130. Turfgrass and Amenity Grassland Utilization and Management (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Plant Sciences 2. Utilization and management of amenity and landscape grassland systems. Emphasis on biology of grass species, ecology and culture practice of sports turf and landscape grassland systems, social and environmental benefits, environmental impacts, and integrated management systems.—III. (III.) Burger

133. Woody Plants in the Landscape: Growth, Ecology and Management (4)
Lecture—3 hours; laboratory—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C or the equivalent preparation in plant biology. Principles and practices of managing trees and shrubs in the urban landscape and other managed environments. Topics include woody plant form; growth response and adaptation; tree management in relation to soil, moisture, climate; plant problems.—II. (II.) Berry

150. Genetics and Plant Conservation: The Biodiversity Crisis (3)
Lecture/discussion—3 hours. Prerequisite: Biological Sciences 1C or the equivalent. Conservation of genic diversity, measurement of diversity, threats to diversity and reasons for protection, the process of extinction, distribution of diversity, determination of what to conserve and means of conservation. Examples drawn largely from forest tree species.—III. (III.) Chetelat, Jasieniuk

160. Restoration Ecology (3)
Lecture—3 hours. Prerequisite: Plant Biology/Evolution and Ecology 117 or Evolution and Ecology 121 or Plant Biology 147 or the equivalent. Conceptual bases of restoration ecology; tools used by restoration ecologists to solve practical problems; scope and success of actual restoration projects.—III. (III.) Eviner

160L. Restoration Ecology Laboratory (1)
Laboratory/discussion—3 hours. Prerequisite: course 160 (may be taken concurrently). Companion field course to course 160. A series of part-day and all day visits to various field sites, involving site evaluations, guest field presentations by local restorationists, and actual restoration activities. Not open for credit to students who completed course 160 prior to spring 2004.—III. (III.) Eviner

Graduate Course

229. Analysis of Horticultural Problems (5)
Lecture—1 hour; laboratory—8 hours; discussion—1 hour; project. Prerequisite: equivalent of B.S. degree in Environmental Horticulture and Urban Forestry, Plant Biology, Agricultural Systems and Environment, or related major, or consent of instructor. Methods of analysis of common plant disorders seen in the landscape, greenhouse, and nursery. Diagnosis of plant disorders caused by soil, water, insects, disease, chemical agents, climactic conditions or cultural practices. Approaches to diagnosis that emphasize acquisition and integration of information. Not open for credit to students who have completed course 241.—III. (III.) Durzan

Environmental Horticulture and Urban Forestry

(College of Agricultural and Environmental Sciences)

Faculty. See Department of Plant Sciences, on page 461.

The Major Program

Students majoring in Environmental Horticulture and Urban Forestry learn how plants improve the environment and the quality of our lives. The major focuses on the biological and physical concepts and horticultural principles of plant production, management of plants and plant ecosystems in landscape settings and sociological aspects of plant/people interactions in the urban environment. Plants are used to revegetate and restore disturbed landscapes, control erosion and reduce energy and water consumption. The ornamental use of plants to improve the aesthetic quality of urban and rural landscapes, recreational areas, interiorscapes and commercial sites is an important aspect of this major. Students may select one of the following four areas of specialization: Urban Forestry, Floriculture/Nursery, Landscape Management/Turf, or Plant Biodiversity/Restoration.

Internships and Career Opportunities. Students are encouraged to develop internships on or off campus to augment their activities in the classroom and laboratory. Internships are available with the department's greenhouse facility, the UC Davis Arboretum, landscape designers, government agencies or regional nurseries. Career opportunities in this field include growing and/or managing plants in a variety of settings, including nurseries, golf courses and arboreta, consulting as an urban, landscape, or restoration horticulturist; business ownership; working for public agencies or private landscape firms/corporations; park management and landscape contracting.

B.S. Major Requirements:

UNITS

Communications 1 recommended as part of the College English Composition Requirement or the Words and Images Core Literacy Component.

Preparatory Subject Matter 61-69
- Environmental Horticulture 1 and 6 7
- Landscape Architecture 30 4
- Biological Sciences 1A, 1B, 1C, or Biological Sciences 2A, 2B, and Plant Sciences 2 13-15
- Environmental Science and Policy 1 or 10 or 30 3-4
- Chemistry 2A-2B 10
- Physics 1A-1B 6
- Plant Sciences 21 and either Mathematics 16A or Statistics 13 6-7
- Select two lower division resource science courses and two lower division social science/humanities courses in consultation with adviser 12-17

Depth Subject Matter 32-37
- Environmental Horticulture 102 4
- Soil Science 100 5
- Plant Sciences 171 4
- Environmental Horticulture 105 or Plant Biology 102 or 108 4-5
- Plant Sciences 192 (minimum of 3 units) 3
- Select two upper division resource science courses and two upper division social science/humanities courses in consultation with adviser 12-16

Areas of Specialization (choose one)
No course may be used to satisfy more than one requirement.

Urban Forestry Option 27
- Environmental Horticulture 100, 101, 130, 133 14
- Entomology 110 5
- Plant Biology 147 4
- Plant Pathology 120 4

Floriculture/Nursery Option 27
- Environmental Horticulture 120, 125 8
- Applied Biological Systems Technology 165 2
- Entomology 110, 135 9
- Plant Sciences 142 4
- Plant Pathology 120 4

Landscape Management/Turf Option 27
- Environmental Horticulture 129, 130, 133 12
- Applied Biological Systems Technology 165 2
- Entomology 110 5
- Plant Biology 117 4
- Plant Pathology 120 4

Plant Biodiversity/Restoration Option 21-32
- Environmental Horticulture 160, 160L 4
- Select two courses from Plant Sciences 130, 150, Environmental Science and Management 141, Environmental Science and Policy 127, 155L, Landscape Architecture 180F, Soil Science 112, Wildlife, Fish, and Conservation Biology 155 5-8
- Select two courses from Environmental Science and Policy 155, Plant Biology 102, 108, 117, 119, 147, Plant Sciences 144, 163, 176, Wildlife, Fish, and Conservation Biology 156, 157 6-10
- Environmental Horticulture 150, or Evolution and Ecology 100, or Plant Biology 116 3-5
- Entomology 100 or 103 or 107 or 110, or Plant Pathology 120, or Soil Science 112 3-5

Total Units for the Major..... 114-138

Major Adviser. D.W. Burger

Advising Center for the major is located in 1224 Plant and Environmental Sciences (530) 752-7738.

Environmental Policy Analysis and Planning

(College of Agricultural and Environmental Sciences)

The Major Program

The major in environmental policy analysis and planning develops an understanding of governmental policy-making and skills for analyzing policy in fields related to environmental quality.

Any student in good standing is eligible to transfer to the major; to do so, please see the major adviser, Joan Ogden in 2011 Academic Surge or Kimberly Mahoney in 1001 Wickson Hall.

The Program. This major provides students with a general background in the natural sciences relevant to environmental policy. It also provides sufficient training in mathematics, statistics, and research methodology to quantitatively analyze environmental problems and policy options. A strong background in policy analysis, including the evaluation of policy alternatives and the study of factors affecting policy formulation and implementation is included. In addition, students are encouraged to develop substantive knowledge in a specific field of environmental policy, such as urban and regional planning, water pollution control, or energy.

Career Alternatives. Environmental policy analysis and planning graduates are prepared for employment in public agencies, consulting firms, and businesses concerned with environmental affairs. The major is also excellent preparation for students who want to go on to graduate work in law, planning, public policy, or management.

B.S. Major Requirements:

UNITS

English Composition and Public Speaking Requirement 7-8

University Writing Program 101, 102A, 104A, 104B, 104C, 104D, or 104E..... 4
Communication 1 or 3 or Dramatic Art 10..... 3-4

Preparatory Subject Matter 48-55

Biological Sciences 1A or 2A or 10 or 10V..... 4-5
Chemistry 2A, 2B..... 10
Plant Sciences 21, or Science & Society 18..... 3
Economics 1A, 1B..... 8
Animal Science 1, Biological Sciences 1B or 2B, Geology 1, Hydrologic Science 124, Plant Biology 12, Soil Science 100 3-5
Environmental Science and Policy 1..... 4
Mathematics 16A-16B or 21A-21B..... 6-8
Physics 1A or 7A ..... 3 or 4
Political Science 1 4
Statistics 13, 32, 102..... 3-4

Satisfaction of General Education requirement.

Depth Subject Matter..... 43-44

(Students must take these units on a letter grade basis, and must attain an overall grade point average of 2.000 or higher in the Depth Subject Matter courses.)
Environmental Science and Policy 110, 160, 164, 168A..... 16
Environmental Science and Policy 172 or Political Science 187 4
Environmental Science and Policy 161..... 4
Environmental Science and Policy 171 or 179..... 3-4
Environmental Science and Policy 178..... 4
Select one course from Sociology 106, Statistics 100, 103, 108, or Agricultural and Resource Economics 106 4
Economics 100 or Agricultural and Resource Economics 100A 5
Environmental Science & Policy 175 or Agricultural and Resource Economics 176..... 4
Students must select courses in the Areas of Specialization that have not been taken in the Depth Subject Matter.

Areas of Specialization (choose one)..... 16-21

Advanced Policy Analysis Option

Select one course from Political Science 100, 104, 105, 120, 122, 155 or Environmental Science and Policy 169 .. 3-4
Select one course from Political Science 162, 164, or 170..... 4
Select one course from Political Science 124, 126, or American Studies 101G..... 4
Select one course from Applied Biological Systems Technology 180, 185 or Environmental and Resource Sciences 186, 186L 4-5
Select one course from Civil and Environmental Engineering 153, Agricultural and Resource Economics 106, or Economics 130..... 4

City and Regional Planning Option

Select one course from Applied Biological Systems Technology 180, 185, or Environmental and Resource Sciences 186, 186L 4-5
Select one course from Civil and Environmental Engineering 165, Environmental Science and Policy 163 .. 3-4
Select one course from Soil Science 118 or Environmental Science and Policy 169..... 3-4
Environmental Science and Policy 171 or 179 4
Select one course from Political Science 100, Community and Regional Development 152, 156, or 171 or Art History 168..... 4

Energy Policy Option

Environmental Science and Policy 167 4
Engineering 160 and Civil and Environmental Engineering 143 8
Select either Geology 130 or Environmental and Resource Sciences 131 3
Environmental Science and Policy 163 4

Environmental Science Option

Students choosing the Environmental Science area of specialization must consult with a faculty adviser to identify an emphasis within this specialization and to select suitable courses. Possible areas of emphasis are biological conservation, pollutants in the environment, ecology, planning in the presence of environmental hazards. If you are considering this area of specialization, please contact the major adviser as soon as possible.

Transportation Planning Option

Select either Civil and Environmental Engineering 165 or Environmental Science and Policy 163 3-4
Select either Environmental Science and Policy 167 or 171 4
Applied Biological Systems Technology 180..... 4
Environmental and Resource Sciences 131..... 3
Economics 145..... 4

Water Quality Option

Environmental Science and Policy 169 3
Select either Environmental and Resource Science 121, or Hydrologic Science 150..... 3
Select one course from Hydrologic Science 141, 143, Geology 134, Soil Science 118..... 3-4
Select one course from Environmental Science and Policy 151, 155, Environmental and Resource Sciences 100, Wildlife, Fish, and Conservation Biology 120 3-4
Select one course from Applied Biological Systems Technology 180, 185, or Environmental Resource Sciences 186, 186L 4-5

Total Units for the Degree 114-128

Major Adviser. J. Ogden *(Environmental Science and Policy)*

Minor Program Requirements:

The faculty for environmental policy analysis and planning offers the following minor. The Environmental Policy Analysis minor is for natural and social science students desiring basic training in policy analysis theory and methods.

UNITS

Environmental Policy Analysis 23-24

Preparation: Economics 1A; basic course in political science.
Environmental Science and Policy 1 4
Environmental Science and Policy 160, 161, 168A..... 13
Environmental Science and Policy 163, 169, 171, 172, 179 6-8

Minor Adviser. J. Ogden *(Environmental Science and Policy)*

Environmental and Resource Sciences

(College of Agricultural and Environmental Sciences)

This major was discontinued as of Fall 2008; see Environmental Science and Management, on page 289.

Courses in Environmental and Resource Sciences (ERS)

Please note, at the time of printing this catalog, Environmental and Resource Sciences (ERS) designated courses were in the process of being changed to Environmental Science and Management (ESM) designated courses (i.e., ERS 100 is now ESM 100). Therefore, to review Environmental Science and Management course descriptions during this transition, see equivalent Environmental and Resource Sciences courses below.

Lower Division Courses

6. Map Reading and Remote Sensing (3)
Lecture/discussion—3 hours. Basic skills in map reading, map grid systems, projections, aerial photography, photogrammetry, remote sensing sensors and platforms; the role of cartography and remote sensing in environmental analysis.—I.

8. Water Quality at Risk (3)
Lecture—2 hours; discussion—1 hour. Natural and human threats to water quality. Balance of science and policy in all aspects of attaining, maintaining, and managing water quality, water contamination. Decoding popular media coverage of water quality and water contamination. GE credit: SciEng or SocSci, Wrt. (Same course as Science and Society 8.)—II. (II.) Hernes

30. World Ecosystems & Geography (3)
Lecture—3 hours. An introduction to the earth's major geographic regions and associated ecosystems, such as deserts, temperate forests, and oceans with an examination of how climate, vegetation regimes, ecological processes, and human activities interact in different regions of the world. (Same course as Environmental Science and Policy 30.) GE credit: SciEng.—II, III. (II, III.)

47. Watershed Processes and Water Quality in the Tahoe Basin (2)
Lecture/laboratory—21 hours; fieldwork—9 hours; discussion—3 hours; term paper. Prerequisite: basic knowledge of environmental, soil, or hydrologic sciences. Course involves 3 days of instruction in Tahoe City. Watershed processes, runoff water quality management, and restoration in the Lake Tahoe Basin. Soils, precipitation-runoff, revegetation and adaptive management related to erosion control, effective solutions, and development of restoration strategies. Students develop and initiate field restoration. (Same course as Hydrologic Science 47.)—Grismer

92. Resource Sciences Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

100. Principles of Hydrologic Science (4)
Lecture—4 hours. Prerequisite: Chemistry 2B, Mathematics 16B, and Physics 7A or 9A. Topics include hydrology (surface and ground water), hydraulic flow through porous media, water in the soil-plant-atmosphere continuum, water quality, flow through open channels, and representative water-resource problems. GE credit: SciEng.—I. (I.) Grismer

100L. Principles of Hydrologic Science Laboratory (2)
Laboratory—3 hours; discussion—1 hour. Prerequisite: course 100 concurrently. Principles governing water transport in pipes, soil, and rainfall runoff. Water quality concerns associated with salinity and contamination. GE credit with concurrent enrollment in course 100: Wrt.—I. (I.) Grismer

108. Environmental Monitoring (3)
Lecture/discussion—2 hours; laboratory—2 hours; fieldwork. Prerequisite: entry-level course work in student's major; specifically: Evolution and Ecology 101, Environmental Science and Policy 100, Environmental Toxicology 101, Wildlife, Fish, and Conservation Biology 100, Environmental and Resource Sciences 100, Soil Science 100, Environmental Horticulture 100, Landscape Architecture 50 or the equivalent for any of these courses. Instrumentation and methods for environmental and ecological monitoring; GPS, sensors, datalogging, and GIS. Wide range of measurement techniques for environmental parameters.—III. (III.) Hopmans

120. Global Environmental Interactions (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one college-level chemistry course; one college-level biology course. Limited to 25 students per discussion section. Relationships among climate, hydrology, biogeochemical cycles, soils and vegetation distribution in diverse landscapes and biomes. Emphasis on physical, chemical, and biological processes affecting ecosystems from the poles to the equator, and human impacts on the environment. Not open to students who have successfully completed course 60. (Formerly course 60.)—II. (II.) Southard

121. Water and Society (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Physics 10 or Geology 1. The role of water as an essential natural resource in contemporary society. Aspects of the scientific method, including descriptions of natural phenomena, measurement techniques, and predictive models. Supply and use of water for municipalities, agriculture, industry, wildlife and recreation. GE credit: SciEng, Wrt.—I. (I.) Silk

131. Air as a Resource (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Chemistry 10. Degradation of the atmospheric resource, historical aspects and effects of air pollution examined. Evaluation of primary gaseous and particulate pollutants and discussion of their impact. GE credit: SciEng, Wrt.—II. (II.) Flocchini

136. Chemistry of the Hydrosphere (3)
Lecture—3 hours. Prerequisite: Chemistry 2B and an upper division course in soil science, hydrologic science, geology, or limnology. Chemical characteristics of water in the hydrologic cycle. Understanding processes and conditions regulating chemical composition of natural waters with particular emphasis on dissolved mineral constituents. Not open for credit to students who have completed Water Science 180 or Hydrologic Science 136. (Former course Hydrologic Science 136.)—III. (III.)

140. Culinary and Medicinal Herbs (3)
Lecture/discussion—3 hours. Prerequisite: Biological Sciences 1C. Growth, identification, cultivation, and use of common culinary and medicinal herbs; herbal plant families; effects of climate and soils on herbs; herbal medicine; ecology and geography of herbs; herb garden design; secondary chemistry of active compounds. (Same course as Plant Biology 140.)—III. Bledsoe

141. Role of Fire in Natural Ecosystems (4)
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 1B and 1C, upper division or graduate standing or consent of instructor; general ecology or environmental science course recommended. Fire regimes and roles in major North American vegetation types, especially in the west. Physics of fire, fire effects on organisms and ecosystem functioning, reconstructing fire histories, fire in resource management, and fire use by indigenous people.—II. (II.) Barbour

144. Trees and Forests (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Sciences 2 or Biological Sciences 1C or 2C. Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology, photosynthesis, respiration, soil processes, life histories, dormancy, forest biodiversity, and agroforestry. Not open for credit to students who have completed Plant Biology 144 or Environmental Horticulture 144. (Former course Plant Biology/Environmental Horticulture 144.) (Same course as Plant Sciences 144).—I. (I.) Bledsoe, Berry, Dahlgren

185. Aerial Photo Interpretation and Remote Sensing (4)
Lecture—2 hours; laboratory—4 hours. Basics of remote sensing and photogrammetry, grids and map projections, aerial photo interpretation, sensors and platforms for aerial and space photography and non-photographic imaging systems, aerial thermography, microwave sensing, and introduction to remote sensing applications.—I. (I.)

186. Environmental Remote Sensing (3)
Lecture—3 hours. Prerequisite: Mathematics 16B and Physics 7C or 9B; upper division standing. Overview of satellite, airborne, and ground-based remote sensing. Building on properties of EM Radiation, isotropic and non-isotropic scattering and absorption, examines applications in hydrologic processes, weather and climate, ecology and land use, soils, geology, forestry, and agriculture. Not open for credit to students who have taken Hydrologic Science 186. (Former course Hydrologic Science 186.)—III. (III.) Ustin

186L. Environmental Remote Sensing Lab (2)
Laboratory—4 hours. Prerequisite: course 186 with grade of C or better. Computer based analysis and visualization of digital images and image processing techniques. Continuation of course 186 providing theory and direct experience in digital image processing.—III. (III.) Ustin

192. Resource Sciences Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.)

194H. Senior Honor Thesis (2-6)
Independent study. Prerequisite: senior standing, overall GPA of 3.500 or higher and consent of master adviser. Independent study, guided research on an environmentally related subject of special interest to the student. May be repeated for credit.—I, II, III. (I, II, III.)

195. Integrating Environmental Science and Management (2)
Lecture/discussion—2 hours. Prerequisite: consent of Instructor; senior status in Environmental Science and Management major or other environmental science major (e.g., Environmental and Resource Sciences, Environmental Biology & Management, Environmental Toxicology, Environmental Policy Analysis and Planning, Wildlife, Fish, and Conservation Biology, Hydrologic Sciences). Students learn about contemporary environmental issues or problems from the combined perspectives of the physical sciences, ecological sciences and policy/management. May be repeated two times for credit.—II. (II.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor.
(P/NP grading only.)

Environmental Science and Management

(College of Agricultural and Environmental Sciences)

Please note, at the time of printing this catalog, Environmental and Resource Sciences (ERS) designated courses were in the process of being changed to Environmental Science and Management (ESM) designated courses (i.e., ERS 100 is now ESM 100). Therefore, to review Environmental Science and Management course descriptions during this transition, see equivalent Environmental and Resource Sciences courses on page 288.

The Major Program

The Environmental Science and Management (ESM) major is designed for students who are interested in solving environmental problems from an interdisciplinary perspective linking the natural and social sciences.

Students who choose this major will study the interaction of physical, biological, and social components of environmental problems. Students completing the program will understand the scientific basis for environmental decision making and the legal, economic, and political issues involved in management of the environment.

The Program. Courses in biology, chemistry, physics, economics, and calculus form the lower-division foundation of the curriculum. These are then tied together with Environmental Science and Policy 1, "Environmental Analysis" which provides an interdisciplinary analysis of several environmental problems. The upper-division core consists of foundation courses in physical, biological, and social sciences, as well as applied courses in environmental monitoring, GIS, impact reporting, and statistical analysis. In their junior year, students must choose a specialized track from the following six options:

(a) Ecology, Biodiversity, and Conservation
(b) Natural Resource Management
(c) Climate Change and Air Quality
(d) Geospatial Information Science
(e) Watershed Science
(f) Soils and Biogeochemistry

A capstone course is required for all seniors and serves to integrate the science, policy/management and biology aspects of the ESM major. All students gain practical experience through field courses and

a required internship. Selected students may also pursue an honors thesis in their senior year.

The ESM major is jointly administered by the Departments of Environmental Science and Policy (ESP) and Land, Air and Water Resources (LAWR). Any student in good standing is eligible to transfer to the major; to do so, please see the student affairs officers in 1001 Wickson Hall or in 1152 Plant and Environmental Sciences Building.

Career Alternatives. Graduates from this program are prepared to pursue careers as practicing environmental scientists, resource analysts and planners working for public agencies and private firms specializing in environmental quality, natural resources or ecological research. The major is also an excellent preparation for graduate or professional training in physical and/or biological environmental science graduate programs, as well as in environmental law, administration and environmental policy.

B.S. Major Requirements:

UNITS

English Composition and Public Speaking requirement 7-8
- University Writing Program 102G or 102B or 101 or 104E 4
- Communication 1, 3 or Dramatic Art 10..... 3-4

Preparatory Subject Matter 44-52
- Biological Sciences 2A, 2B, 2C 14
- Geology 1 or 50..... 3-4
- Chemistry 2A, 2B or 2AH, 2BH..... 10
- Physics 7A, 7B 8
- Economics 1A..... 4
- Mathematics 16A, 16B or 21A, 21B 6-8
- Environmental Science and Policy 1..... 4

Breadth/General Education 6-24

See General Education requirement.

Core Subject Matter..... 29-32
- Environmental Science and Management 120..... 4
- Environmental Science and Policy 100..... 4
- Environmental Science and Policy 162..... 4
- Statistics 13 or 100 (Statistics 100 recommended)..... 4
- Select one course from Environmental Science and Management 108 or Environmental Science and Policy 179..... 4
- Applied Biological Systems Technology 180..... 4
- Internship-Environmental Science and Management or Environmental Science and Policy 192 3
- Capstone Class-Environmental Science and Management 195 2
- Honors Thesis (optional)-Environmental Science and Management 194H..... 0-3

Ecology, Biodiversity and Conservation Track 36-45
- Select one course from Atmospheric Science 60, 116, 133, Environmental and Resource Sciences 121, 131, Environmental Science and Policy 152, Geology 134 or Soil Science 100, 118..... 3-5
- Select one course from Environmental Science and Policy 170, 171, 172 or 179 4
- Evolution and Ecology 100 4
- Select one course from Environmental Science and Policy 127 or Wildlife, Fish, and Conservation Biology 154..... 4
- Select one course from Environmental Science and Policy 123, 124 or Wildlife, Fish, and Conservation Biology 100..... 3-4
- Select one course from Environmental Science and Policy 121 or Wildlife, Fish, and Conservation Biology 122..... 4
- Evolution and Ecology 104, 115, Environmental Science and Policy 151, 155, Plant Biology 117 or Wildlife, Fish, and Conservation Biology 155..... 4
- Select one course from Evolution and Ecology 147 or Plant Sciences 162 or Environmental Horticulture 160..... 3-4
- Select one biome level course on wetlands, forests, or water (See adviser for list) and one organismal biology course on birds, mammals, or plants (See adviser for list). Must also take one lab associated with courses 8-12

Natural Resource Management Track..... 34-41
- Select three courses from Environmental Science and Policy 160, 167, 168A, 169, 171, 172 or 179..... 7-9
- Select one course from Environmental Science and Policy 161 or Hydrology 150 3-4
- Statistics 103 (or equivalent upper-division statistics) 4
- Select two courses from Entomology 104, Environmental Science and Management 144, Environmental Science and Policy 151, 155, Evolution and Ecology 115, Plant Biology 117, Plant Sciences 130 or Wildlife, Fish, and Conservation Biology 110, 111, or 120..... 6-8
- Select two courses from Atmospheric Science 116, Environmental Science and Management 121, 131 or Soil Science 100..... 6-8
- Environmental Science and Management 185 (or equivalent) 4

Climate Change and Air Quality Track..... 33-40
- Atmospheric Science 60 4
- Select three courses from Atmospheric Science 115, 116, 133, 160, Environmental Science and Management 131 or Geology 108..... 9-11
- Select two courses from Environmental Science and Management 100, 121, Environmental Science and Policy 116N, Hydrology 143 or Soil Science 100..... 6-9
- Select one course from Environmental Science and Management 144, Environmental Science and Policy 124, 150C, 151, 155, Evolution and Ecology 115 or Plant Sciences 130..... 3-4
- Select one course from Evolution and Ecology 147 or 149..... 4
- Select two courses from, Environmental Science and Policy 163, 167, 171, 172 or 179 7

Geospatial Information Science Track..... 33-42
- Select three courses from Applied Biological Systems Technology181N, Environmental Science and Management 185, 186, 186L or Hydrology 182..... 9-12
- Select two courses from Environmental Science and Policy 163, 169, 171, 172 or 179..... 7-8
- Select two courses from Environmental Science and Policy 121, Plant Sciences 121, Statistics 104, 106, 108, 130A, 130B or 137..... 8
- Other applicable information technology courses from the Engineering department including database management, digital library science and network and Web technologies may be substituted for spatial information with approval.
- Select three courses from the following options. Must cover both physical and biological courses from Atmospheric Science 110, 116, 133, Soil Science 100, 112 or 118, Environmental Science and Policy 124, 150C, 151, 152, 155, Geology 136, Plant Sciences 101 or Plant Biology 117 9-14

Soils and Biogeochemistry..... 38-46
- Soil Science 100..... 5
- Select four courses from Environmental Science and Management 100, Hydrology 134, Soil Science 105, 107, 109, 111, 112 or 120..... 17-21
- Select two courses from Environmental Science and Management 121, Environmental Science and Policy 171, 172 or 179 7-8
- Select one course from Environmental Science and Management 185, Geology 134, Hydrology 147, Landscape Design 150 or Soil Science 118 3-4
- Select two courses from Environmental Science and Management 144, Environmental Science and Policy 116N, 150A, 150C, 151, 155, Plant Biology 117 or Plant Sciences 130..... 6-8

Watershed Science Track 36-42
- Hydrology 10..... 3
- Environmental Science and Management 100 or 121 4
- Hydrology 143..... 3
- Geology 35 3
- Soil Science 100 5
- Select two courses from Environmental Science and Policy 168A, 169, 179 or Hydrology 150..... 6-8
- Select one course from Atmospheric Science 115, 116 or 133 3-4
- Select one pair from Environmental Science and Policy 151 & 151L or 155 & 155L.... 7
- Select one course from Entomology 116, Evolution and Ecology 115, 134 or Wildlife, Fish, and Conservation Biology 120 3-5

Total Units for the Major 113-138

Major Advisers. Marcel Holyoak *(Environmental Science and Policy)* and Wendy Silk *(Land, Air and Water Resources)*

Advising centers for the major, including peer advising, are located in both the Environmental Science and Policy and Land, Air and Water Resources departments.

Students whose last names begin with the letters A-L, please see Kimberly Mahoney in 1001 Wickson Hall.

Students whose last names begin with the letters M-Z, please see Elizabeth Shull in 1150 Plant and Environmental Sciences.

Courses in Environmental Science and Management (ESM)

Upper Division Course

120. Global Environmental Interactions (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one college level chemistry course; one college level biology course. Limited to 25 students per discussion section. Relationships among climate, hydrology, biogeochemical cycles, soils and vegetation distribution in diverse landscapes and biomes. Emphasis on physical, chemical, and biological processes affecting ecosystems from the poles to the equator, and human impacts on the environment. Not open to students who have successfully completed Environmental Resources Sciences 60 or 120. (Formerly Environmental Resources Sciences 60 and 120.)—II. (II.) Southard

Environmental Science and Policy

(College of Agricultural and Environmental Sciences)

Howard V. Cornell, Ph.D., Chairperson of the Department

Department Office. 1023 Wickson Hall
(530) 752-3026

Faculty

Marissa L. Baskett, Ph.D., Assistant Professor
Howard V. Cornell, Ph.D., Professor
Charles R. Goldman, Ph.D., Professor
Distinguished Graduate Mentoring Award

Edwin D. Grosholz, Ph.D., Professor, Specialist in Cooperative Extension
Susan L. Handy, Ph.D., Professor
Susan P. Harrison, Ph.D., Professor
Alan M. Hastings, Ph.D., Professor
Robert Hijmans, Ph.D., Assistant Professor
Marcel Holyoak, Ph.D., Professor
John L. Largier, Ph.D., Professor
C.-Y. Cynthia Lin, Ph.D., Assistant Professor *(Environmental Science and Policy, Agricultural and Resource Economics)*
Mark N. Lubell, Ph.D., Associate Professor
Steven G. Morgan, Ph.D., Professor
Joan M. Ogden, Ph.D., Professor
Benjamin S. Orlove, Ph.D., Professor
James F. Quinn, Ph.D., Professor
Eliska Rejmankova, Ph.D., Professor
Paul A. Sabatier, Ph.D., Professor
James N. Sanchirico, Ph.D., Professor
Mark W. Schwartz, Ph.D., Professor *Academic Senate Distinguished Teaching Award*
Andrew Sih, Ph.D., Professor
Daniel Sperling, Ph.D., Professor *(Environmental Science and Policy, Civil and Environmental Engineering)*
Michael Springborn, Ph.D., Assistant Professor
Thomas P. Tomich, Ph.D., Professor *(Environmental Science and Policy, Human and Community Development)*

Emeriti Faculty

Robert A. Johnston, M.S., Professor Emeritus
Seymour I. Schwartz, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Peter J. Richerson, Ph.D., Professor Emeritus

The Program of Study

Environmental Science and Policy is a teaching and research department offering courses, workshops, and directed group study classes that focus on the complex problems of human-environment relations. The department offers Bachelor of Science degrees in Environmental Science and Management and in Environmental Policy Analysis and Planning. Courses in Environmental Science and Policy also supplement major programs in a wide variety of established disciplines.

Current Information. Through its continuing contacts with many other departments and teaching divisions on the campus, the department develops a variety of special courses and workshops each year that cannot be listed here. Check with the Department office and with the expanded course description handbook of the College of Agricultural and Environmental Sciences for up-to-date information about courses.

Graduate Study. The Graduate Group in Ecology which is housed in Environmental Science & Policy offers a M.S. and Ph.D. degree program. Further information about graduate programs in ecology should be obtained from the chairperson of the Graduate Group in Ecology.

Graduate Adviser. See the *Class Schedule and Registration Guide*.

Courses in Environmental Science and Policy (ESP)

Lower Division Courses

1. Environmental Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: University Writing 1; Biological Sciences 1A, 1B; upper-division University Writing Program recommended. Analysis of the physical, biological, and social interactions which constitute environmental problems. Emphasis on analysis of environmental problems, the consequences of proposed solutions, and the interaction of environmental science and public policy in creating solutions.—II. (I.) Baskett, Sanchirico

10. Current Issues in the Environment (3)
Lecture—3 hours. Prerequisite: elementary biology recommended. The science behind environmental issues, and policies affecting our ability to solve domestic and international environmental problems. Resources, environmental quality, regulation, environmental perception and conservation. Integrative case studies. Not open for credit to students who have completed course 1. GE credit: SciEng.—II. (II.) Holyoak

30. World Ecosystems & Geography (3)
Lecture—3 hours. An introduction to the earth's major geographic regions and associated ecosystems, such as deserts, temperate forests, and oceans with an examination of how climate, vegetation regimes, ecological processes, and human activities interact in different regions of the world. (Same course as Environmental and Resource Sciences 30.) GE credit: SciEng.—II, III. (II, III.)

30G. The Global Ecosystem: Laboratory/ Discussion (2)
Laboratory/discussion—3 hours. Prerequisite: course 30 concurrently. Presents natural history skills in plant and animal identification, soils, and geology. Emphasis on the diverse organisms and habitats of Northern California. GE credit with concurrent enrollment in course 30: Wrt.

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internship supervised by member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

Upper Division Courses

100. General Ecology (4)
Lecture—3 hours; discussion—1 hour. Prerequisites: Biological Sciences 1A, 1B, 1C, Mathematics 16A, 16B; Statistics 13 recommended. Theoretical and experimental analysis of the distribution, growth and regulation of species populations; predator-prey and competitive interactions; and the organization of natural communities. Application of evolutionary and ecological principles to selected environmental problems.—I, II. (I, II.) Cornell, Sih

101. Ecology, Nature, and Society (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 1 or 2 or course 30 or Evolution and Ecology 100 or Biological Sciences 101. Interdisciplinary study of diversity and change in human societies, using frameworks from anthropology, evolutionary ecology, history, archaeology, psychology, and other fields. Topics include population dynamics, subsistence transitions, family organization, disease, economics, warfare, politics, and resource conservation. (Same course as Anthropology 101.) GE credit: SocSci, Div, Wrt.—II. (II.)

102. Cultural Ecology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one lower division course in the social sciences, upper division standing. Comparative survey of the interaction between diverse human cultural systems and the environment. Primary emphasis given to people in rural and relatively undeveloped environments as a basis for interpreting complex environments. Not open for credit to students who have completed course 133. (Former course 133.) (Same course as Anthropology 102.) GE credit: SocSci, Div, Wrt.—III. (III.)

105. Evolution of Societies and Cultures (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 1 or 2 or course 30 or Evolution and Ecology 100 or Biological Sciences 101. Interdisciplinary study of social and cultural evolution in humans. Culture as a system of inheritance, psychology of cultural learning, culture as an adaptive system, evolution of maladaptations, evolution of technology and institutions, evolutionary transitions in human history, coevolution of genetic and cultural variation. Only 2 units of credit to students who have completed course 101 or Anthropology 101 prior to fall 2004. (Same course as Anthropology 105.) GE credit: SocSci, Wrt.—III. (III.)

(a) Environmental Science

110. Principles of Environmental Science (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 1A or 7A, Mathematics 16B or 21B, and Biological Sciences 1A. Application of physical and chemical principles, ecological concepts, and systems approach to policy analysis of atmospheric environments, freshwater and marine environments, land use, energy supplies and technology, and other resources.—II. (II.) Largier

111. Marine Environmental Issues (1)
Discussion—1 hour; seminar—2 hours. Prerequisite: upper division standing or consent of instructor; concurrent enrollment in at least one course from courses 124, 152, Evolution and Ecology 106, 110, 114; residence at or near Bodega Marine Laboratory required. Student must complete the application available at http://www.bml.ucdavis.edu. An examination of critical environmental issues occurring in coastal waters. Course links together material from concurrent courses at BML to develop an integrative understanding of marine environments and their conservation. Includes readings, group discussions, and interaction with visiting speakers. May be repeated two times for credit. (Same Course as Evolution and Ecology 111.)—IV. (IV.) Gaylord, Largier, Morgan, Sanford

116N. Oceanography (3)
Lecture—2 hours; laboratory—3 hours; field work. Prerequisite: one of Geology 1, 2, 16 or 50. Advanced oceanographic topics: Chemical, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic impacts, and climate change; integrated earth/ocean/atmosphere systems; weekly lab and one weekend field trip. Offered in alternate years. (Same course as Geology 116N.)—II. (II.)

(b) Ecological Analysis

121. Population Ecology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1B, 1C, Mathematics 16A-16B. Development of exponential and logistic growth models for plant and animal populations, analysis of age structure and genetic structure, analysis of competition and predator-prey systems. Emphasis is on developing models and using them to make predictions and solve problems. Offered in alternate years. GE credit: SciEng, Wrt.—II. Baskett, Hastings

123. Introduction to Field and Laboratory Methods in Ecology (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100 or the equivalent, Statistics 102 or the equivalent. Introduces students to methods used for collecting ecological data in field and laboratory situations. Methods used by population ecologists and community ecologists; emphasis on experimental design, scientific writing and data analysis.—(III.) Baskett

124. Marine and Coastal Field Ecology (3)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours; fieldwork—3 hours. Prerequisite: upper division standing or consent of instructor. Introductory animal biology (Biological Sciences 1B) recommended; residence at or near Bodega Marine Lab required. Student must complete the application available at http://www.bml.ucdavis.edu. Ecology of marine populations and communities living in diverse habitats along the California coast. Hands-on learning using scientific process and tools of the biological trade to address ecological questions arising during field trips. Critical thinking through discussing scientific literature.—IV. (IV.) Morgan

127. Plant Conservation Biology (4)
Lecture/discussion—3 hours; discussion—1 hour; term paper. Prerequisite: Environmental Science and Policy 100 or equivalent upper division general ecology. Principles governing the conservation of plant species and plant communities, including the roles of fire, exotic species, grazing, pollination, soils, and population genetics; analytic and practical techniques for plant conservation; and introduction to relevant legal, ethical, and policy issues. Limited enrollment.—II. (II.) Harrison

(d) Aquatic Ecosystems Analysis

150A. Physical and Chemical Oceanography (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Science and Policy/Geology 116, Physics 9B, Mathematics 22C, Chemistry 1C; or upper division standing in a natural science and consent of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (Same course as Geology 150A.)—I. (I.) McClain, Spero, Largier

150B. Geological Oceanography (3)
Lecture—3 hours. Prerequisite: Geology 50 or 116. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Geology 150B.)—II. (II.) McClain

150C. Biological Oceanography (4)
Lecture—3 hours; discussion—1 hour; fieldwork—one weekend field trip required. Prerequisite: Biological Sciences 1A and a course in general ecology or consent of instructor. Ecology of major marine habitats, including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Segment devoted to human use. (Same course as Geology 150C.)—IV. (IV.)

151. Limnology (4)
Lecture—3 hours; discussion—1 hour; special project. Prerequisite: Biological Sciences 1A and junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environment.—III. (III.) C. Goldman

151L. Limnology Laboratory (3)
Laboratory—6 hours; two weekend field trips. Prerequisite: course 151 (may be taken concurrently); junior, senior, or graduate standing. Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology.—III. (III.) C. Goldman

152. Coastal Oceanography (3)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours; fieldwork—3 hours. Prerequisite: upper division standing or consent of the instructor; physics (Physics 9B), calculus (Mathematics 21B) and exposure to physical and chemical oceanography (Geology/Environmental Science and Policy 150A) are recommended; residence at or near Bodega Marine Laboratory required. Student must complete the application available at http://www.bml.ucdavis.edu. The oceanography of coastal waters, including bays, river plumes, nearshore and estuaries; focus on transport patterns, how they are forced and implications for ecological and environmental problems. Pertinent for students in oceanography, ecology, environmental engineering, geology and hydrology.—IV. (IV) Largier

155. Wetland Ecology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or Plant Biology 117 required; course 110 or 151 recommended. Introduction to wetland ecology. The structure and function of major wetland types and principles that are common to wetlands and that distinguish them from terrestrial and aquatic ecosystems.—I. (I.) Rejmankova

155L. Wetland Ecology Laboratory (3)
Lecture—1 hour; laboratory—6 hours; field-work—two 1-day weekend field trips. Prerequisite: course 155 required (may be taken concurrently). Modern and classic techniques in wetland field ecology. Emphasis on sampling procedures, vegetation analysis, laboratory analytical procedures, and examples of successful wetland restoration techniques.—I. (I.) Rejmankova

(e) Environmental Policy Analysis

160. The Policy Process (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1; Economics 1A; intermediate statistics; course 172. Alternative models of public policymaking and application to case studies in the U.S. and California.—II. (II.)

161. Environmental Law (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and one course in environmental science (course 1, 10, 110, Biological Sciences 1A, Environmental Toxicology 10, or Resource Sciences 100); Political Science 1 and University Writing Program 1 recommended. Introduction for non-Law School students to some of the principal issues in environmental law and the judicial interpretation of some important environmental statutes, e.g., NEPA. GE credit: SocSci, Wrt.—III. (III.)

162. Environmental Policy (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. Compares economic with socio-cultural approaches to understanding the causes of environmental problems and strategies for addressing them. Includes different approaches to the policy process, policy instruments, and environmental behavior. Applies these principles to several problems.—II. (II.) Springborn

163. Energy and Environmental Aspects of Transportation (4)
Lecture—3 hours; extensive writing. Prerequisite: Economics 1A and Civil and Environmental Engineering 162. Engineering, economic, and systems planning concepts. Analysis and evaluation of energy, air quality and selected environmental attributes of transportation technologies. Strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Evaluation of vehicle emission models. (Same course as Civil and Environmental Engineering 163.) Offered in alternate years. GE credit: Wrt.—I. Sperling

164. Ethical Issues in Environmental Policy (3)
Lecture—3 hours. Prerequisite: courses 160, 168A; seniors only in Environmental Policy Analysis and Planning or by consent of instructor. Basic modes of ethical reasoning and criteria of distributive justice applied to selected topics in environmental policymaking.—III. (III.) Sabatier

167. Energy Policy (4)
Lecture—4 hours; term paper. Prerequisite: Economics 1A, Mathematics 16B, or consent of instructor. Survey of primary energy resources (fossil, renewable, nuclear), energy conversion methods, future energy demand scenarios, and environmental impacts of energy. Overview of energy policy in the U.S. Analysis of policy alternatives for addressing energy-related environmental and national security issues. Offered in alternate years.—(III.) Ogden

168A. Methods of Environmental Policy Evaluation (5)
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: Statistics 13; Economics 100 or Agricultural and Resource Economics 100A; Mathematics 16B or 21B; course 1; upper division standing. Evaluation of alternatives for solution of complex environmental problems; impact analysis, benefit-cost analysis, distributional analysis, decision making under uncertainty, and multi-objective evaluation.—I. (I.) Ogden

168B. Methods of Environmental Policy Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 168A. Continuation of course 168A, with emphasis on examination of the literature for applications of research and evaluation techniques to problems of transportation, air and water pollution, land use, and energy policy. Students will apply the methods and concepts by means of a major project.

169. Water Policy and Politics (3)
Lecture—3 hours. Prerequisite: Economics 1A or Political Science 1. The governance of water, including issues of water pollution/quality and water supply. The politics of water decision-making and effectiveness of water policy. Broad focus on federal water policy, with case examples from nationally significant U.S. watersheds. GE credit: SocSci.—(III.) Lubell

(f) Environmental Planning

170. Conservation Biology Policy (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and Economics 1A; Economics 100 or Agricultural and Resource Economics 100A recommended. Analysis of policies designed to conserve species and their habitats. Emphasis on how individual incentives affect the success of conservation policies. Valuation of endangered species and biodiversity. Criteria for deciding conservation priorities.—(III.) Schwartz

171. Urban and Regional Planning (4)
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1; a course in social science and a course in environmental science. How cities plan for growth in ways that minimize environmental harm. Standard city planning tools (general plan, zoning ordinance) and innovative new approaches. Focus on planning requirements and practices in California. Relationships between local, regional, state, and federal policy.—III. (III.) Handy

172. Public Lands Management (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. Investigation of alternative approaches to public lands management by Federal and state agencies. The role each agency's legislation plays in determining the range of resource allocations. GE credit: SocSci.—III. (III.) Lubell

173. Land Use and Growth Controls (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1, Economics 1A, intermediate statistics (Sociology 106 or Statistics 102 or the equivalent), and local government (Applied Behavioral Science 157, 158 or Political Science 100, 102 or 104.) Exposes students to the economic, political, and legal factors affecting land use and growth controls, and helps students critically evaluate written materials in terms of their arguments and supporting data.

175. Natural Resource Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics 100B or Economics 100 or the equivalent. Economic concepts and policy issues associated with natural resources, renewable resources (ground water, forests, fisheries, and wildlife populations) and non-renewable resources (minerals and energy resources, soil). (Same course as Agricultural and Resource Economics 175.) GE credit: SocSci.—III. (III.) Lin

178. Applied Research Methods (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 103 or Sociology 106 or the equivalent. Research methods for analysis of urban and regional land use, transportation, and environmental problems. Survey research and other data collection techniques; demographic analysis; basic forecasting, air quality, and transportation models. Collection, interpretation, and critical evaluation of data.—II. (II.) Handy

179. Environmental Impact Assessment (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and one course in environmental science (course 100, 110 or the equivalent). Introduction to the information resources and methods typically used in environmental impact analysis. Emphasis on how environmental information is applied to planning, environmental regulation, and public policymaking, with case studies from California land use and natural resource policy.—II. (II.)

179L. Environmental Impact Reporting Using Geographic Information (2)
Laboratory/discussion—2 hours; laboratory—4 hours. Prerequisite: course 179 concurrently. Introduction to Geographic Information Systems (GIS) by using ArcView for assessment and environmental planning. Not open for credit to students who have completed Applied Biological Systems Technology 180, 181 or Agricultural Systems and Environment 132.

(g) Other Courses

190. Workshops on Environmental Problems (1-8)
Laboratory—2-16 hours. Prerequisite: consent of instructor. Workshops featuring empirical analyses of contemporary environmental problems by multidisciplinary student teams. Guided by faculty and lay professionals, the teams seek to develop an integrated view of a problem and outline a series of alternative solutions. Open to all upper division and graduate students on application. (P/NP grading only.)—I, II, III. (I, II, III.)

191A. Workshop on Food System Sustainability (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: upper-division standing; Plant Sciences 15, Community and Regional Development 20, Agricultural and Resource Economics 121, Plant Sciences 150 or consent of the instructor. Priority enrollment for seniors in the sustainable agriculture and food systems major; limited to 25 students per section. First in a two-quarter senior capstone course sequence. Identify projects addressing specific problems and opportunities of sustainable agriculture and food systems, form multidisciplinary teams, and identify and consult with key stakeholders to understand their needs and concerns.—I. (I.) Tomich

191B. Workshop on Food System Sustainability (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 191A. Priority enrollment for seniors in the sustainable agriculture and food systems major; limited to 25 students per section. Continuation of course 191A. Student teams conduct analyses of a specific issue in sustainable agriculture or food systems, prepare a critical assessment of technological, economic, environmental, and social dimensions of options for action and present their results to stakeholders.—II. (II.) Tomich

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

212A. Environmental Policy Process (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course in public policy (e.g., Environmental Science and Policy 160); environmental law (e.g., Environmental Science and Policy 161); course in bureaucratic theory (e.g., Political Science 187 or Environmental Science and Policy 166); course in statistics (e.g., Sociology 106 or Agricultural and Resource Economics 106). Introduction to selected topics in the policy process, applications to the field of environmental policy. Develops critical reading skills, understanding of frameworks of the policy process and political behavior, and an ability to apply multiple frameworks to the same phenomena. Offered in alternate years. (Same course as Ecology 212A.)

212B. Environmental Policy Evaluation (4)
Lecture—1 hour; discussion—1 hour; seminar—2 hours. Prerequisite: intermediate microeconomics (e.g., Economics 100); Statistics 108 or Agricultural and Resource Economics 106; policy analysis (e.g., Environmental Science and Policy 168A or the equivalent); Agricultural and Resource Economics 176. Methods and practices of policy analysis; philosophical and intellectual bases of policy analysis and the political role of policy analysis. (Same course as Ecology 212B.) Offered in alternate years.—(III.) Springborn

220. Tropical Ecology (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: advanced introductory ecology course—course 100, Evolution and Ecology 101, 117; Evolution and Ecology 138 recommended. Open to graduate and undergraduate students who meet requirement subject to consent of instructor. An overview of present status of knowledge on structure and processes of major tropical ecosystems. Differences and similarities among tropical and temperate systems stressed. Offered in alternate years.—(III.) Rejmankova

228. Advanced Simulation Modeling (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 128-128L; Statistics 108 or Agricultural and Resource Economics 106. Advanced techniques in simulation modeling; optimization and simulation, dynamic parameter estimation, linear models, error propagation, and sensitivity testing. Latter half of course will introduce model evaluation in ecological and social system models.

252. Sustainable Transportation Technology and Policy (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 160 or the equivalent. Role of technical fixes and demand management in creating a sustainable transportation system. Emphasis on technology options, including alternative fuels, electric propulsion, and IVHS. Analysis of market demand and travel behavior, environmental impacts, economics and politics. (Same course as Civil and Environmental Engineering 252.)—III. Sperling

275. Economic Analysis of Resource and Environmental Policies (4)
Lecture/discussion—4 hours. Prerequisite: Agricultural and Resource Economics 204/Economics 204. Development of externality theory, market failure concepts, welfare economics, theory of renewable and non-renewable resource use, and political economic models. Applications to policy issues regarding the agricultural/environment interface and managing resources in the public domain. (Same course as Agricultural and Resource Economics 275.)—III. (III.)

278. Research Methods in Environmental Policy (3)
Lecture/discussion—3 hours. Prerequisite: Agricultural and Resource Economics 106 or the equivalent. Introduction to scientific research in environmental policy. Major issues in the philosophy of the social sciences. How to design research that acknowledges theoretical assumptions and that is likely to produce evidence in an intersubjectively reliable fashion with explicit recognition of its uncertainties.

298. Directed Group Study (1-5)

299. Research (1-12)
Prerequisite: graduate standing. (S/U grading only.)

Environmental Sciences

See Agricultural Management and Rangeland Resources, on page 141; Atmospheric Science, on page 169; Environmental and Resource Sciences, on page 288; Environmental Biology and Management, on page 286; Environmental Horticulture and Urban Forestry, on page 287; Environmental Policy Analysis and Planning, on page 288; Environmental Toxicology, on page 293; Hydrology, on page 339; Landscape Architecture, on page 354; Soil and Water Science, on page 494; and Wildlife, Fish, and Conservation Biology, on page 533.

Environmental Toxicology

(College of Agricultural and Environmental Sciences)

Ronald S. Tjeerdema, Ph.D., Chairperson of the Department

Department Office. 4138 Meyer Hall
(530) 752-1142; *http://www.envtox.ucdavis.edu*

Faculty

Gary N. Cherr, Ph.D., Professor
(Environmental Toxicology, Nutrition)
Michael S. Denison, Ph.D., Professor
Fumio Matsumura, Ph.D., Professor
(Environmental Toxicology, Entomology)
Marion G. Miller, Ph.D., Professor
Nilesh Gaikwad, Ph.D., Assistant Professor
Patricia Oteiza, Ph.D., Professor
(Environmental Toxicology, Nutrition)
Robert H. Rice, Ph.D., Professor
Takayuki Shibamoto, Ph.D., Professor
Ronald S. Tjeerdema, Ph.D., Professor
Barry W. Wilson, Ph.D., Professor
(Animal Science, Environmental Toxicology)
Matthew J. Wood, Ph.D., Assistant Professor
Qi Zhang, Ph.D., Assistant Professor

Emeriti Faculty

Donald G. Crosby, Ph.D., Professor Emeritus
Dennis P. H. Hsieh, Sc.D., Professor Emeritus
James N. Seiber, Ph.D., Professor Emeritus
Michael W. Stimmann, Ph.D., Lecturer Emeritus
Dorothy E. Woolley, Ph.D., Professor Emertus

Affiliated Faculty

George V. Alexeeff, Ph.D., Adjunct Professor
Deborah Bennett, Ph.D., Associate Professor
(Public Health Sciences, School of Medicine)
Arthur Craigmill, Ph.D., Specialist in Cooperative Extension
Mari Golub, Ph.D., Adjunct Professor *(CNPRC)*
Matt Hengel, Ph.D., Assistant Adjunct Professor
Dirk Holstege, Ph.D., Assistant Adjunct Professor
Mike Johnson, Ph.D., Associate Adjunct Professor
(School of Veterinary Medicine)
Norman Kado, Ph.D., Adjunct Professor
John Knezovich, Ph.D., Adjunct Professor
Melanie Marty, Ph.D., Associate Adjunct Professor
Keith Miles, Ph.D., Lecturer *(USGS)*
Alyson E. Mitchell, Ph.D., Professor
(Food Science and Technology)
Cecilia Von Beroldingen, Ph.D., Lecturer
(UC Davis Extension Forensics Program and Department of Justice)
Zachary A. Wong, Ph.D., Adjunct Professor

The Major Program

Toxic agents found in the environment include pesticides, food additives, industrial waste, metals and chemicals produced by animals, plants, fungi and bacteria. Students in the Environmental Toxicology major learn about the potential for toxicants to produce adverse effects by understanding both their environmental fate and biological activity. They learn about monitoring concentrations and the distribution and persistence of agents found in water, soil, air and foods. Toxicity testing procedures and exposure assessment are used to help signal potential for harm to humans and other species. By understanding the cellular targets and biochemical mechanisms of perturbation by toxicants, toxicologists can better estimate adverse effects. Overall, students learn mechanisms by which toxic agents act, their origin and fate and how toxicologists evaluate the risk of adverse effects and balance them against the benefits of use.

The Program. Preparatory courses in biology, chemistry, mathematics, and physics are required to provide the chemical and biological principles which underlie toxicology. Students in the major are expected to understand the environmental fate and biological activity of different classes of toxic substances, and the legislative issues which arise from chemical use. Opportunities are available to develop in-depth understanding in areas of emphasis through selection of electives.

Specializations/Emphases. Elective course work in many disciplines can complement the required core courses. Providing a framework for selecting restricted electives, the major offers specializations in *(1)* Environmental Toxicology and Chemistry, *(2)* Forensic Science and Regulatory Toxicology, and *(3)* Molecular and Biomedical Toxicology. The first category includes topics in chemical fate, transport and degradation, as well as ecology, wildlife, and aquatic toxicology. The second category includes forensic science, environmental policy and management, and public health. The third category includes pharmacology, biotechnology, medicine, veterinary medicine, and food toxicology. Students are encouraged to select course work from these specializations to match their interests.

Internships and Career Alternatives. Occupations that use environmental toxicology include risk assessment, pharmaceutical or food additive toxicity testing and research, managing regulatory compliance, residue or forensic analysis, pest control, monitoring and field sampling, industrial hygiene, and environmental health and safety. A substantial proportion of graduates elect to pursue advanced training in graduate or professional schools. Others with the B.S. degree have gone on to law, medical, pharmacy, or veterinary medical school, as well as to graduate degrees in pharmacology, toxicology, agricultural and environmental chemistry, or public health. During undergraduate study, optional internships or research projects are recommended to provide training and work experience to help students set future goals.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 62-69

Biological Sciences 1A, 1B, 1C or 2A, 2B, 2C 14-15
Chemistry 2A-2B-2C or 2AH-2BH-2CH, and 118A-118B-118C or 128A-128B-128C, 129A..... 26-27
Plant Sciences 21 3
Environmental Toxicology 10, 20 or 30 . 3-4
Mathematics 16A-16B or 21A-21B..... 6-8
Physics 1A-1B or 7A-7B 6-8
Statistics 100 4
Satisfaction of the General Education requirement to include courses selected with adviser's approval to complement the major; courses in agricultural economics, environmental studies, political science, psychology, and sociology are particularly recommended.

Depth Subject Matter 34-35

Biological Sciences 101 and 102 or 102 and 103 6-7
Environmental Toxicology 101, 102A-102B, 103A-103B, 138 and (128, 131, 135, or 146) 23

Restricted Electives 24

Electives selected for area of specialization/emphasis with faculty adviser's approval; see department website for details.

Total Units for the Major 120-128

Major Adviser. Takayuki Shibamoto

Advising Center for the major is in 4111 Meyer Hall. Contact the Academic Program Adviser at (530) 752-1042.

Minor Program Requirements:

UNITS

Environmental Toxicology 18

Environmental Toxicology 101, 102A, 103A 12
Elective courses 6 units minimum, selected from Environmental Toxicology 10, 128, 131, 135, 138, 146, 190, 198 and 199; 4 units combined maximum of 190, 198 and 199 with adviser approval 6

Minor Adviser. M.S. Denison

Graduate Study. Programs of study leading to M.S. and Ph.D. degrees are available through related Graduate Groups such as Pharmacology and Toxicology; Biochemistry, Molecular, Cellular, and Developmental Biology; Agricultural and Environmental Chemistry; and the Forensics Science Masters Degree Program. For information on graduate study, contact the Advising office or the appropriate graduate adviser; see Graduate Studies, on page 109.

Graduate Advisers. M.G. Miller *(Pharmacology and Toxicology)*, T. Shibamoto *(Agricultural and Environmental Chemistry)*

Courses in Environmental Toxicology (ETX)

Lower Division Courses

10. Introduction to Environmental Toxicology (3)
Lecture—3 hours. Hazardous substances, their effects on humans and their actions and movement in the environment. Emphasis on substances of current concern. GE credit: SciEng.—I. (I.) Tjeerdema

20. Introduction to Forensic Science (4)
Lecture—3 hours; discussion—1 hour. Basic principles of forensic science and the types of information on which investigations focus, how the information is obtained and how it is used in criminal investigations, types of scientific skills that are required to practice forensic science as a profession, guidance on future training. Real cases will be discussed, and demonstrations of certain methods provided. GE credit: SciEng, Wrt.—II. (II.) Wood

30. Chemical and Drug Use and Abuse (3)
Lecture—3 hours. An overview of chemical use and abuse in our society. The effects of chemicals (therapeutic drugs, pesticides, food additives, herbal remedies, environmental contaminants, and recreational drugs) on humans and other living systems. GE credit: SciEng.—III. (III.) Miller

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Principles of Environmental Toxicology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B, 118B, or 128B and Biological Sciences 1A. Principles of toxicology with a focus on environmental, industrial, and natural chemicals. Topics include fate and effects of chemicals in organisms and the environment, air pollutants, insecticides, aquatic toxicology, endocrine disruptors, biomarkers and bioassays, and risk assessment.—I. (I.) Denison

102A. Environmental Fate of Toxicants (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B, 118B, 128B or consent of instructor. Properties of toxic chemicals influencing their distribution and transformations; action of environmental forces affecting toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants. Not open for credit to students who have completed course 112A.—II. (II.) Tjeerdema

102B. Quantitative Analysis of Environmental Toxicants (5)
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 102A. Sample preparation methods for trace analysis of environmental toxicants. Concept and techniques of advanced analytical instrumentation. Interpretation and use of analytical data. Not open for credit to students who have completed course 112B.—III. (III.) Shibamoto

103A. Biological Effects of Toxicants (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 102; course 101 and Neurobiology, Physiology, and Behavior 101 recommended. Biological effects of toxic substances in living organisms. Metabolism, cellular and tissue targets, mechanisms of action, and pathological effects. Not open for credit to students who have completed course 114A.—II. (II.) Rice

103B. Biological Effects of Toxicants: Experimental Approaches (5)
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 103A. Experimental approaches for assessing the biological effects of toxicants. Not open for credit to students who have completed course 114B.—III. (III.) Miller

104. Environmental and Nutritional Factors in Cellular Regulation and Nutritional Toxicants (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 101; Biological Sciences 103 or Animal Biology 103. Cellular regulation from nutritional/toxicological perspective. Emphasis: role of biofactors on modulation of signal transduction pathways, role of specific organelles in organization/regulation of metabolic transformations, major cofactor functions, principles of pharmacology/toxicology important to understanding nutrient/toxicant metabolism. (Same course as Nutrition 104.)—I. (I.) Oteiza, Rucker

110. Toxic Tragedies and Their Impact on Society (2)
Lecture—2 hours. Prerequisite: Biological Sciences 10 or the equivalent or consent of instructor; Chemistry 118A recommended. Examination of toxic tragedies, their origins, consequences, and effects on toxic regulation. Offered in alternate years. GE credit: Wrt.—II. (II.) Rice

111. Introduction to Mass Spectrometry (3)
Lecture—3 hours. Prerequisite: Chemistry 118C. Introduction to mass spectrometry, including ionization techniques, mass analyzers, interpretation of mass spectra, and applications of mass spectrometry. Emphasis on fundamental concepts of mass spectrometry necessary to identify and quantify organic molecules.

120. Perspectives in Aquatic Toxicology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B, 118B or 128B, Biological Sciences 1A, or consent of instructor. Toxic substances, their fate in marine and freshwater systems, and their effects on aquatic organisms, populations, and ecosystems. Emphasis on substances and issues of current concern. Offered in alternate years.—II. Cherr, Tjeerdema

127. Environmental Stress and Development in Marine Organisms (10)
Lecture—4 hours; laboratory—12 hours; discussion—2 hours. Prerequisite: course 101 or Biological Sciences 102 or 104 or the equivalent; course 114A or Nutrition 114 recommended. Course taught at Bodega Marine Laboratory. Effects of environmental and nutritional stress, including pollutants, on development and function in embryos and larvae of marine organisms. Emphasis on advanced experimental methods. (Same course as Nutrition 127.) GE credit: SciEng.—IV. Cherr

128. Food Toxicology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102 and 103. Chemistry and biochemistry of toxins occurring in foods, including plant and animal tox-

ins, intentional and unintentional food additives. The assessment of food safety and toxic hazards. (Same course as Food Science and Technology 128.) GE credit: SciEng.—III. (III.) Shibamoto, Mitchell

130. The Role and Applications of Toxicology in Modern Industry (3)
Lecture—3 hours. Prerequisite: course 101 required; course 103A recommended. Role of toxicology in industry research and development, human health and environmental protection, hazard and risk evaluations, risk management and communications, product stewardship, and regulatory compliance. Scientific principles and methods of toxicology in chemical, energy, pharmaceutical, pesticide, biotechnology industries.—III. (III.) Wong

131. Environmental Toxicology of Air Pollutants (3)
Lecture—3 hours. Prerequisite: Chemistry 8B (may be taken concurrently) or the equivalent; Biological Sciences 102 recommended. Field trip required. Toxicology of air pollutants in the ambient, indoor, and occupational environments. Health effects, sources, environmental fates, pulmonary responses, sampling and analyses, and air-quality criteria and standards.—I. (I.) Kado

135. Health Risk Assessment of Toxicants (3)
Lecture—3 hours. Prerequisite: course 101; course 114A recommended. Current practices of health risk assessment of environmental chemicals using toxicological principles and their application to regulatory control of these chemicals. GE credit: SciEng.—I. (I.) Marty

138. Legal Aspects of Environmental Toxicology (3)
Lecture—3 hours. Prerequisite: course 10 or 101 recommended. Federal and California legislation concerning air and water pollution, pesticide use, food and feed additives, consumer protection, and occupational exposure to toxic substances; roles of federal regulatory agencies; alternatives to government control.—II. (II.) Alexeeff

146. Exposure and Dose Assessment (3)
Lecture—3 hours. Prerequisite: course 112A; course 135 recommended. The exposure component of risk assessment; specifically, the presence and/or formation of toxic substances in environmental media, their movement within and between contaminated media, and the contacts of human populations with those media. Offered in alternate years. GE credit: SciEng.—III. (III.) Bennett

190. Seminar (1)
Seminar—1 hour. Prerequisite: consent of instructor. Selected topics presented by students, faculty, or outside speakers covering current research and instructional activities within environmental toxicology. Reports and discussion concerning oral and written presentations, literature sources, and career opportunities. (P/NP grading only.)—I, II, III. (I, II, III.)

190C. Research Group Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference of advanced research methods and the interpretation of research results. (P/NP grading only.)—I, II, III. (I, II, III.)

190S. Environmental Toxicology Career Seminar (1)
Seminar—1 hour. Careers in environmental toxicology; discussions with graduates from the Department of Environmental Toxicology and other experts in the field. (P/NP grading only.)—I. (I.)

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the College of Agricultural and Environmental Sciences. Internships supervised by a member of the faculty. (P/NP grading only.)

194HA-194HB. Honors Research (3-3)
Discussion—1 hour; laboratory—6 hours. Prerequisite: senior standing, minimum GPA of 3.250, consent of instructor. Specific research project conducted under the supervision of a faculty sponsor. Experience to include experimental design, learning new techniques, data analysis and interpretation of findings. (P/NP grading only; deferred grading pending completion of sequence.)

194HC. Honors Research (3)
Laboratory—6-9 hours; discussion—1 hour. Prerequisite: senior standing, minimum GPA of 3.250, and consent of instructor. Continuation of course 194HA-194HB. (P/NP grading only.)

197T. Tutoring in Environmental Toxicology (1-5)
Hours and duties will vary depending upon course being tutored. Prerequisite: advanced standing in Environmental Toxicology, a related major, or the equivalent experience and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

203. Environmental Toxicants (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 128C (or the equivalent), or Chemistry 8B and consent of instructor. Toxic chemicals: selected topics illustrating their occurrence, structure, and the reactions underlying detection, toxicity, fate, and ecological importance. Offered in alternate years.—II. Matsumura

214. Mechanisms of Toxic Action (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102, 103, and consent of instructor. Chemical, biochemical, and molecular mechanisms underlying the adverse effects of toxic chemicals. Students are required to write a grant proposal and participate in a grant review panel. Offered in alternate years.—(III.) Denison, Hammock

220. Analysis of Toxicants (3)
Lecture—3 hours. Prerequisite: coursework in organic chemistry. Principles of microanalysis of toxicants. Theoretical considerations regarding separation, detection and quantitative determination of toxicants using chemical and instrumental techniques. (Same course as Forensic Science 220.)—I. (I.) Wood

220L. Analysis of Toxicants Laboratory (2)
Laboratory—6 hours. Prerequisite: course 220 (may be taken concurrently) and consent of instructor. Laboratory techniques for microanalysis of toxicants. Separation, detection, and quantitative determination of toxicants using chemical and instrumental methods.—I. (I.) Wood

228. Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3)
Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 220 and Chemistry 129C; or consent of instructor. Application of GC/MS techniques to investigate toxic chemicals. Mass spectral fragmentations and their application to the structural elucidation. Practical application of GC/MS in current research. Preference given to environmental toxicology graduate students. Offered in alternate years.—II. (II.) Holstege

234. Neurophysiological Basis of Neurotoxicology (3)
Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 101 or the equivalent; basic understanding of neurophysiology. Mechanisms of action at the cellular and systemic level of a number of different neurotoxins and toxicants. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. (Same course as Physiology 234.)—I. (I.) Lein

240. Ecotoxicology (3)
Lecture—3 hours. Prerequisite: elementary course in toxicology and ecology or the equivalent, or consent of instructor. Principles of toxicology as applied to chemical action on natural populations, communities, and ecosystems. Physical, chemical, and biological characteristics which influence ecotoxic effects, modeling, and field research. Selected case histories are analyzed and presented in class.—III. (III.) Johnson, Miles

250. Reproductive Toxicology (3)
Lecture—1.5 hours; lecture/discussion—1.5 hours. Prerequisite: Physiology 220 or Pharmacology—Toxicology 203. Application of toxicological principles in reproductive studies. Effects of toxicants on the male, female, and developing embryo/fetus. Critical evaluation of reproductive toxicity studies and development of mechanistic approaches to understanding how chemical exposure can adversely affect reproduction. Offered in alternate years.—(II.) Miller, Golub

260. Immunotoxicology (3)
Lecture—3 hours. Prerequisite: undergraduate or graduate introduction to immunology coursework recommended, but not required; graduate standing or consent of instructor. Provides students with skills and knowledge for evaluating and applying research on the impact of environmental toxicants on immunological function in human and wildlife populations. Offered in alternate years.—Golub

270. Toxicology of Pesticides (3)
Lecture—3 hours. Prerequisite: one course each in (a) Organic Chemistry, (b) Biochemistry, (c) Toxicology (course 101 or equivalent), or consent of instructor; graduate standing. Classification and chemical properties of pesticides, their mode of action, metabolism and disposition, pesticide resistance, effects on human health and ecological health and methods of risk benefit analyses. Offered in alternate years.—II. Matsumura

278. Molecular Techniques (3)
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Recombinant DNA technology and its applications. (Same course as Forensic Science 278.) Offered in alternate years.—(I.) Denison, Rice

280. Forensic DNA Analysis (3)
Lecture—3 hours. Prerequisite: coursework in genetics and molecular biology. Foundation in theory and practice of forensic DNA analysis; past, present, and emerging technologies; legal and quality assurance issues. DNA extraction, DNA quantitation, multiplex amplification of STR loci, capillary electrophoresis of amplified products, and analysis of STR typing data. (Same course as Forensic Science 280.) Offered in alternate years.—Von Beroldingen

290. Seminar (1)
Seminar—1 hour. Current topics in environmental toxicology. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Advanced Research Conference (1)
Lecture/discussion—1 hour. Prerequisite: consent of instructor. Presentation and critical discussion of advanced research methods and interpretation of research results. Designed primarily for graduate students. (S/U grading only.)—I, II, III. (I, II, III.)

297T. Tutoring in Environmental Toxicology (1-5)
Hours and duties will vary depending upon course being tutored. Prerequisite: graduate standing in Environmental Toxicology, a related major, or the equivalent experience, and consent of instructor. Teaching toxicology including conducting discussion groups for regular departmental courses under direct guidance of staff. May be repeated for credit up to a total of 5 units. (S/U grading only.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Epidemiology

See Medicine and Epidemiology (VME), on page 522.

Epidemiology (A Graduate Group)

Tim E. Carpenter, Ph.D., Chairperson of the Group

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Faculty

Rob Atwill, D.V.M., Ph.D. *(Vet Med Teaching & Research Center)*
Rahman Azari, Ph.D. *(Statistics)*
Laurel A. Beckett, Ph.D., Professor *(Epidemiology and Preventive Medicine)*
Debbie Bennett, Assistant Professor *(Department of Public Health Services)*
Robert BonDurant, D.V.M., Professor *(Population Health and Reproduction)*
Walter Boyce, D.V.M., Ph.D., Professor *(VM: Population Health & Reproduction)*
Joshua Breslau, M.D., Professor *(Internal Medicine)*
Ken Brown, M.D., Professor *(Nutrition)*
Lesley Butler, Ph.D. *(Department of Public Health)*
Tim E. Carpenter, Ph.D., Professor *(Medicine and Epidemiology)*
James Case, D.V.M., Ph.D., Professor of Clinical Diagnostic Medicine *(Medicine and Epidemiology)*
Diana Cassady, Dr.PH., Department of Public Health Sciences
Munashe Chigerwe, M.D., M.P.H. *(VM: Medicine and Epidemiology)*
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Stuart Cohen, M.D., Professor *(Internal Medicine)*
Patricia Conrad, D.V.M., Ph.D., Professor *(Pathology, Microbiology, and Immunology)*
Rosemary Cress, Dr.PH., Department of Public Health Sciences
Beate Crossley, Ph.D. *(VM: Virology and Biotechnology)*
Kathy DeRiemer, Ph.D., Department of Public Health Sciences
Kathryn Dewey, Ph.D., Professor *(Nutrition)*
Christiana Drake, Ph.D., Associate Professor *(Statistics)*
Jonathan Ducore, M.D., Pediatrics
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Neil Flynn, M.D., Professor *(Internal Medicine)*
Janet Foley, MS, D.V.M., Ph.D., *(Medicine and Epidemiology)*
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Jeff Gill, Ph.D. *(Biostatistics)*
David R. Gibson, Ph.D., Associate Professor
Ellen Gold, Ph.D., Professor *(Epidemiology and Preventive Medicine)*
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Danielle Harvey, Ph.D., Department of Public Health Sciences *(Biostatistics)*
Irva Hertz-Picciotto, Ph.D., Department of Public Health Sciences
Sharon Hietala, Ph.D., Associate Professor of Clinical Diagnostic Medicine *(Medicine and Epidemiology)*
David W. Hird, M.P.V.M., D.V.M., Ph.D., Professor Emeritus *(Medicine and Epidemiology)*
Bruce Hoar, Ph.D. *(Medicine & Epidemiology)*
Ana-Maria Iosif, Ph.D. *(Med: Public Health Science, Division of Biostatistics)*
Jiming Jiang, Ph.D., Professor *(Statistics)*
Philip Kass, M.P.V.M., D.V.M., Ph.D., Associate Professor *(Population Health and Reproduction)*
Kyoungmi Kim, Ph.D. *(MED: Department of Public Health Sciences, Division of Biostatistics)*
Richard L. Kravitz, M.D., Professor *(General Medicine)*
Christine Kreuder-Johnson, Ph.D. *(Wildlife Health Center)*
Jennifer Lee, M.D. *(Internal Medicine)*
Paul Leigh, Ph.D., Department of Public Health
Bruce Leistikow, M.D., Associate Professor *(Epidemiology and Preventive Medicine)*
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James Marcin, M.D., MPH *(Pediatrics/Critical Care Medicine)*
Jonna Mazet, Ph.D. *(Wildlife Health Center)*
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Andres Perez, Ph.D. *(VM: Medicine & Epidemiology)*
William Reisen, Ph. D. *(Veterinary Medicine, Vectorborne Disease)*
Christine Stewart, MPH, Ph.D. *(Department of Nutrition)*
Lihong Qi, Ph.D. *(Human Genetics)*
John Robbins, M.D., Associate Professor *(Internal Medicine)*
David M. Rocke, Ph.D., Professor *(Management)*
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Marc Schenker, M.D., Professor *(Epidemiology and Preventive Medicine)*
Thomas Scott, Ph.D., Professor *(Entomology)*
Chin-Shang Li *(MED: Department of Public Health Science, Department of Biostatistics)*
Robert Shumway, Ph.D., Professor *(Statistics)*
Robert Szabo, M.D., Professor *(Orthopaedic Surgery)*
Daniel Tancredi, Ph.D. *(Med: Pediatrics)*
Steve Tharatt, M.D. *(Pulmonary & Critical Care Medicine)*
Mark Thurmond, D.V.M., M.P.V.M., Ph.D., Professor Emeritus *(Medicine and Epidemiology)*
Michael Ziccardi, Ph.D. *(Wildlife Health Center)*

Emeriti Faculty

Nancy East, M.P.V.M., D.V.M., Professor Emeritus
Bruce Eldridge, Ph.D., Professor Emeritus
Alvin Wiggins, Ph.D., Professor Emeritus

Affiliated Faculty

Robert Atwill, D.V.M., Ph.D., Associate Professor Agronomist/Assistant Cooperative Extension Specialist *(Population Health and Reproduction)*
Rahman Azari, Ph.D., Lecturer *(Statistics)*
Nicholas Lerche, Ph.D., Associate Adjunct Professor *(Population Health and Reproduction)*
Jonna Mazet, M.P.V.M., D.V.M., Ph.D., Assistant Clinical Professor *(Wildlife Health Center)*
Steven Samuels, Ph.D., Assistant Clinical Professor *(Epidemiology and Preventive Medicine)*

Graduate Study. The Graduate Group in Epidemiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Areas of emphasis include environmental/occupational epidemiology; infectious disease epidemiology; epidemiologic methods and biostatistics; health services and economics; nutritiona epil, and wildlife epidemiology. For detailed information regarding the program, address the chairperson of the group or see the website.

Graduate Advisers. P. Kass *(Population Health and Reproduction)*, Tim Carpenter *(VM, Medicine & Epidemiology)* Danielle Harvey *(Public Health Sciences, Biostatistics)*

Required Courses for the Program

Prerequisite Courses. Prerequisites may be taken concurrently with required courses below.

Mathematics 16A-16B or 21A-21B
Statistics 102, 106, and 108, or Preventive Veterinary Medicine 402, 403

Required Courses. These courses are required of all students in the program; M.S. and Ph.D. degrees. These requirements cannot be waived and must be met before a student's Qualifying Examination.

Epidemiology 204, 205A, 205B, 206, 207, 208 and 290
Statistics 130A-130B
One course from Population Health and Reproduction 202 or Statistics 144

Related Courses. For additional course work in Epidemiology, please see Medicine and Epidemiology, Preventive Veterinary Medicine, Population Health and Reproduction, Epidemiology and Preventive Medicine, and Statistics.

Courses in Epidemiology (EPI)

Graduate Courses

204. Statistical Models, Methods, and Data Analysis for Scientists (4)
Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: Statistics 130B or 131B, or 133; Statistics 108 recommended. Development of broad statistical skills useful for the analysis of scientific data. Special emphasis given to determining factors associated with characteristics like disease and time-to-event. Analysis of data that can be modeled as generalized linear and generalized linear mixed models, parametric and non-parametric survival models, and models for correlated, clustered, longitudinal data.—III. Johnson

204A. Foundation of Statistical Models, Methods, and Data Analysis for Scientists (4)
Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: Statistics 130A, or Statistics 131A, or Statistics 133, course 228 recommended. Provides the mathematical statistics foundation for statistical models, methods, and data analysis.—II. (II.) Nguyen

204B. Statistical Models, Methods, and Data Analysis for Scientists (4)
Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: course 204A; Statistics 108 recommended. Introduces statistical models, methods, and data analysis in the areas of generalized linear, survival, and correlated data methodology.—III. (III.) Nguyen

205A. Principles of Epidemiology (4)
Lecture—4 hours. Prerequisite: Preventive Veterinary Medicine 402 or consent of instructor. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests, and an introduction to epidemiologic study design and surveillance. (Same course as Preventive Veterinary Medicine 405.)—I. (I.)

205B. Integration of Epidemiologic Concepts (2)
Discussion—2 hours. Prerequisite: Preventive Veterinary Medicine 405/course 205A can be taken concurrently. In-depth analysis and integration of basic epidemiologic concepts and approaches to epidemiologic research presented in Preventive Veterinary Medicine 405/course 205A, with more mathematical and theoretical basis and examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of diagnostic tests, study design, and surveillance.—I. (I.)

206. Epidemiologic Study Design (3)
Lecture—20 sessions; discussion—6 sessions; laboratory—4 sessions. Prerequisite: course 205A and 205B or consent of instructor. Builds on concepts presented in course 205. Concepts of epidemiologic

study design-clinical trials, observational cohort studies, case control studies-introduced in course 205A are covered in more depth, using a problem-based format. Discussion of published epidemiologic studies. (Same course as Preventive Veterinary Medicine 406A.)—II. (II.) Miller

207. Advanced Concepts in Epidemiologic Study Design (4)
Lecture/discussion—4 hours. Prerequisite: course 205B and 206. In-depth integration of advanced concepts in study design, with theory and examples, including confounding, effect modification under additive and multiplicative models, internal and external validity, bias, misclassification, alternate designs, source populations, statistical power and sample size, causation, and genetic epidemiology.—III. Gold, Kass

208. Analysis and Interpretation of Epidemiologic Data (3)
Lecture—16 sessions; laboratory—21 sessions; project. Prerequisite: course 204 (may be taken concurrently) and 207, and either Statistics 144 or Population Health and Reproduction 202 and entry level skill in standard statistical software (e.g., SPSS, BMDP, SAS, Stata, MinTab, S-Plus). Application of theory and concepts of statistics and epidemiology to analysis and interpretation of data typically found in veterinary and human epidemiologic research.—III. Beckett

210A. Analytic Epidemiology I: Case-Control Studies (3)
Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: Statistics 130B and Preventive Veterinary Medicine 406 (or the equivalent), or consent of instructor. Theory and practice of epidemiologic data analysis. Topics include confounding, stratification, matching, interaction, and logistic regression. (Same course as Population Health and Reproduction 210A.)—II. (II.) Kass

210B. Analytic Epidemiology II: Cohort Studies (3)
Lecture—3 hours. Prerequisite: course 210A. Theory and practice of epidemiologic data analysis. Topics include rates, rate standardization, cohort analysis, Poisson regression, and survival/failure-time methods. (Same course as Population Health and Reproduction 210B.)—III. (III.) Kass

220. Problems in Epidemiologic Study Design (4)
Lecture—3 hours; term paper. Prerequisite: Preventive Veterinary Medicine 405 and 406 or the equivalent; Population Health and Reproduction 207 concurrently; Statistics 102 and 106 or the equivalent. Design and development of research protocols and funding applications for peer review. Application of research methods data collection and management and statistical analysis in research proposals. Methods of evaluating research proposals, mechanisms of funding, specifying human subjects considerations.—III. (III.) Gold

222. Epidemiological Modeling (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Preventive Veterinary Medicine 405. Techniques of model building and simulation of infectious diseases will be explored. Epidemiologic modeling philosophy, construction and validation will be emphasized. Offered in alternate years.—II. Carpenter

223. Spatial Epidemiology (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Preventive Veterinary Medicine 405 or Environmental Studies 126 or Veterinary Medicine 409. Geographic Information Systems (GIS) and spatial statistics. Students are expected to complete a term project based on their graduate research. Offered in alternate years.—II. Carpenter

224. Health and Ecological Risk Analysis (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Preventive Veterinary Medicine 406 or consent of instructor; background in statistics, including multivariable techniques; a course in differential equations. A methodological approach to risk analysis for human and animal-related health and ecological issues. Basic principles of risk analysis, including perception, communication, assessment and management. Emphasis on the assessment of risk.—III. (III.) Carpenter

225. Advanced Topics in Epidemiology Methods (2)
Discussion—2 hours. Prerequisite: courses 205B, 206, and 207 (or equivalents, with consent of instructor). An in-depth study of topics in epidemiology theory and methods, selected from: causal inference, confounding, study design, or other related areas, with year to year variation. Readings are assigned and students are expected to lead discussions on them. May be repeated for credit when topic differs. Not offered every year.—II, III. (II, III.) Hertz-Picciotto

226. Methods for Longitudinal and Repeated Measurement Data (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 204 or consent of instructor. Mixed models for longitudinal data (LD)/repeated measurements; Mean and covariance models; General linear LD models; Random coefficients models; Linear mixed effects models for continuous outcome; Generalized linear mixed effects model for discrete outcome including binary, ordinal and count data.—I. (I.) Nguyen

228. Quantitative Methods for Epidemiology (4)
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Mathematics 16A-B or Mathematics 17A-B or Mathematics 21A-B or equivalent; basic knowledge of the principles of linear algebra, such as those taught in mathematics 22A or the equivalent, is assumed. The application of calculus and linear algebra techniques to epidemiological problems. Topics include applications of derivatives, integration, exponentials and logarithms, multivariable calculus, infinite series, and vector and matrix algebra, with examples and problems taken from epidemiology and related subjects.—I. (I.) Harvey

229. Geographic Information Systems for Health Professionals (4)
Lecture—2 hours; laboratory—6 hours. Emphasis on basic geographic and data management principles. Focus on software proficiency in application to analyzing/solving health-related problems. For graduate and professional students in epidemiology, public health, preventive veterinary medicine, health informatics with interest in spatial techniques in research.—III. (III.) Case

240. Principles of Injury Epidemiology (3)
Lecture/discussion—3 hours. Overview of the epidemiology of human injury, including general principles, surveillance methods, behavioral factors, environmental factors, treatment issues and engineering and legal interventions related to vehicular injuries, drownings, falls, fires and burns, poisonings, firearm injuries, and other intentional injuries.—I. (I.) Romano

250. Introduction to Clinical Research Design and Epidemiology (1)
Lecture—1 hour. Prerequisite: graduate standing or medical/nursing personnel. For medical personnel who are or will be involved in medical research. Review of basics of clinical study design and analysis of clinical data. (S/U grading only.)—I. (I.) McCurdy, Romano

251. Environmental Epidemiology (3)
Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 405 (may be taken concurrently); upper division undergraduates who have completed Environmental Studies 126; or the equivalent. Examination of the human health effects and the risk of disease from community, occupational, and personal exposure to toxic substances. Offered in alternate years.—I. Gold

252. Social Epidemiology (2)
Lecture/discussion—2 hours. Prerequisite: course 205A; consent of instructor. Social determinants of health; psychosocial and physiological pathways; health and social inequality; gender and racial/ethnic disparities in health; social support, social cohesion and health; social gradient in behavioral risk factors; social ecological approaches to health intervention; interventions addressing social determinants. (Same Course as Public Health Sciences 252.)—III. (III.) Gibson

260. Epidemiology of Chronic Diseases and Aging (3)
Lecture/discussion—3 hours. Overview of the epidemiology of chronic disease in old age. Topics include biology of aging, epidemiology of cardiovascular disease, neoplasms, osteoporosis and fractures, psychosocial factors and health in old age, dementias, functional status and prevention of disease.—II. (II.)

270. Research Methods in Occupational Epidemiology (3)
Laboratory/discussion—3 hours. Prerequisite: Environmental Studies 126 or Preventive Veterinary Medicine 405; and Statistics 102 or Epidemiology and Preventive Medicine 402. Methods used in epidemiologic research on occupational hazards. Topics include design and analysis of cohort and case-control studies, sample size, measuring dose, choosing a control group, validation of employment and health data, interpreting negative studies, and analysis software. Offered in alternate years.—III. Beaumont

272. Cancer Epidemiology (2)
Recitation—1 hour; discussion—1 hour. Prerequisite: must have basic understanding of epidemiologic and statistical concepts that are covered in courses 205A, 205B, 206 (may be taken concurrently), and Statistics 102. We will cover the underlying concepts essential to understanding cancer epidemiology, such as trends in incidence and survival, epidemiologic methods used to assess cancer etiology, prevention and control, and an introduction to the cancerinitiation and progression multi-stage model.—II. (II.) Butler, Cress

290. Seminars in Epidemiology (1)
Seminar—1 hour. Students will actively participate in presentation and discussion of ongoing or published research projects in epidemiology. (S/U grading only.)—III. (III.)

291. Seminars in Human Health Services Research and Clinical Epidemiology (1)
Seminar—1 hour. Critical review, evaluation, and discussion of research in health services and clinical epidemiology. Presentation of statistical, epidemiologic, and econometric methods. Students present their own research and critique the work of others. May be repeated for credit. (Same course as General Medicine 291.) (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
Seminar—1-5 hours. Group study in selected areas of epidemiology.

299. Research (1-12)
Research in selected areas of epidemiology. (S/U grading only.)

Evolution and Ecology

(College of Biological Sciences)

Maureen Stanton, Ph.D., Chairperson of the Department

Department Office. 2320 Storer Hall
(530) 752-1272; *http://www.eve.ucdavis.edu*

Faculty

David J. Begun, Ph.D., Professor
Graham Coop, Ph.D., Assistant Professor
James A. Doyle, Ph.D., Professor
Jonathan A. Eisen, Ph.D., Professor
(Medical Microbiology and Immunology)
Brian P. Gaylord, Ph.D., Associate Professor
Richard K. Grosberg, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Susan L. Keen, Ph.D., Senior Lecturer, SOE
Artyom V. Kopp, Ph.D., Associate Professor

Charles H. Langley, Ph.D., Professor
Brian R. Moore, Ph.D., Assistant Professor
Gail L. Patricelli, Ph.D., Associate Professor
Bruce H. Rannala, Ph.D., Professor
Marcel Rejmanek, Ph.D., Professor
Eric D. Sanford, Ph.D., Associate Professor
Thomas W. Schoener, Ph.D., Professor
Sebastian Schreiber, Ph.D., Professor
H. Bradley Shaffer, Ph.D., Professor
Arthur M. Shapiro, Ph.D., Professor
Academic Senate Distinguished Teaching Award
John J. Stachowicz, Ph.D., Professor
Maureen L. Stanton, Ph.D., Professor
UC Davis Prize for Teaching and Scholarly Achievement
Sharon Y. Strauss, Ph.D., Professor
Donald R. Strong, Ph.D., Professor
Michael Turelli, Ph.D., Professor
Peter C. Wainwright, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Susan Williams, Ph.D., Professor

Emeriti Faculty

John H. Gillespie, Ph.D., Professor Emeritus
Leslie D. Gottlieb, Ph.D., Professor Emeritus
Milton Hildebrand, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Everett W. Jameson, Ph.D., Professor Emeritus
Peter R. Marler, Ph.D., Professor Emeritus
Robert W. Pearcy, Ph.D., Professor Emeritus
Judy A. Stamps, Ph.D., Professor Emeritus
Catherine A. Toft, Ph.D., Professor Emeritus
Kenneth E. F. Watt, Ph.D., LL.D, Professor Emeritus

The Evolution, Ecology and Biodiversity Major Program

The major in Evolution, Ecology and Biodiversity offers the student a broad background in the theoretical and empirical basis of our understanding of the diversity and distribution of living organisms.

The Program. The program of study for the major begins with a core of introductory courses in mathematics, physical sciences, and biology. These are followed by survey courses in biodiversity, evolution and ecology and various more specialized courses that focus the student on particular disciplines or organisms, with an emphasis on problem-solving and critical thinking. Evolution, Ecology and Biodiversity majors may earn either a Bachelor of Science or a Bachelor of Arts degree. The requirements for the B.S. degree program include more science courses, such as biochemistry, whereas those for the A.B. degree program allow room for more electives within the humanities and social sciences. The A.B. degree is especially appropriate for those students who wish to combine arts or languages with evolution and ecology for career preparation in such areas as scientific writing, translating or illustration.

Career Alternatives. A degree in Evolution, Ecology and Biodiversity prepares the student for career opportunities in research, teaching, health professions, veterinary medicine, agriculture, environmental management, and industry. Many students gain some research experience while at UC Davis and choose to continue their training at the graduate level. This track offers careers in academics, government, environmental organizations, or business.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 40-44

Biological Sciences 2A-2B-2C 14
Chemistry 2A-2B 10
Chemistry 8A-8B 6
Mathematics* 17A-17B (17C recommended) or 21A-21B (21C recommended) or Statistics 100 or 102 4-8
Physics 1A-1B 6
*Mathematics 16A-16B accepted to fulfill this requirement only for transfer students admitted prior to fall 2013.

Depth Subject Matter 36

Biological Sciences 101 4
One course from Evolution and Ecology 100; Geology 107; Anthropology 151 3-4
One course from Evolution and Ecology 101; Environmental Science and Policy 100; Wildlife, Fish, and Conservation Biology 151 4
Additional upper division course work in biological science to achieve a total of 36 or more units 24-25
Include at least one course from each of the areas of study below.
Areas of Study:
(1) Biodiversity: Entomology 103; Evolution and Ecology 105, 108, 112, 134, 140; Microbiology 105; Nematology 110; Plant Biology 116, 118, 147, 148; Wildlife, Fish, and Conservation Biology 110, 111, 120.
(2) Advanced Evolution and Ecology: Evolution and Ecology 102, 103, 104, 107, 115, 117, 119, 120, 131, 138, 141, 147, 149, 150, 180A and 180B, 181.
Note: A maximum of 4 units of variable-unit courses (numbered 192, 198, 199) may be applied to upper division elective unit requirements. Courses numbered 197T are not applicable to the upper division elective unit requirement.

Total Units for the Major 76-80

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 55-65

Biological Sciences 2A-2B-2C 14
Chemistry 2A-2B-2C 15
Chemistry 8A-8B or 118A-118B-118C 6-12
Mathematics* 16A-16B-16C or 21A-21B-21C 9-12
Physics 7A-7B-7C 12
*Mathematics 16A-16B-16C accepted to fulfill this requirement only for transfer students admitted prior to fall 2013.

Depth Subject Matter 49

Biological Sciences 101, 105 (or 102 + 103), 104 10-13
Evolution and Ecology 100, 101 8
Statistics 100, 102 or 130A-130B 4-8
Additional upper division course work in biological science to achieve a total of 49 or more units, including at least 2 units (6 hours per week) of laboratory or fieldwork 20-27
Include at least one course from the Biodiversity and two courses from the Advanced Evolution and Ecology areas of study below.
Areas of Study:
(1) Biodiversity: Entomology 103; Evolution and Ecology 105, 108, 112, 134, 140; Microbiology 105; Nematology 110; Plant Biology 116, 118, 147, 148; Wildlife, Fish, and Conservation Biology 110, 111, 120.
(2) Advanced Evolution and Ecology: Evolution and Ecology 102, 103, 104, 107, 115, 117, 119, 120, 131, 138, 141, 147, 149, 150, 180A and 180B, 181.
Note: A maximum of 4 units of variable-unit courses (numbered 192, 198, 199) may be applied to upper division elective unit requirements, but not to the upper division laboratory requirement. Courses numbered 197T are not applicable to the upper division elective unit requirement.

Total Units for the Major 104-114

Biological Sciences Electives

The following courses are acceptable toward the fulfillment of the upper division biological sciences requirement in the A.B. and B.S. major programs and may be selected without adviser approval.

Other elective courses are approved on an individual basis by petition through an adviser.

Anatomy, Physiology and Cell Biology 100
Anthropology 151, 152, 153, 154A, 154B, 155, 156
Biological Sciences, all upper division courses
Chemistry 107A, 107B
Entomology, all upper division courses except 110
Environmental Science and Policy 110, 116, 121, 123, 150C, 151, 151L
Geology 107, 107L, 150C
Microbiology, all upper division courses
Molecular and Cellular Biology, all upper division courses
Nematology 110
Neurobiology, Physiology, and Behavior, all upper division courses
Nutrition 101, 111
Pathology, Microbiology, and Immunology 101, 126, 126L, 128
Philosophy 108
Plant Biology, all upper division courses
Psychology 121, 122, 127, 129
Wildlife, Fish, and Conservation Biology 120, 120L, 121

Minor Program Requirements:

UNITS

Evolution, Ecology and Biodiversity 18

Evolution and Ecology 100, 101 8
One course in Biodiversity 3-5
Entomology 103; Evolution and Ecology 105*, 108*, 112, 112L*‡, 114*, 134, 134L*‡, 134F*‡, 140*; Plant Biology 116*, 118*, 147*, 148*; Wildlife, Fish and Conservation Biology 110, 110L*‡, 111, 111L*‡, 120, 120L*‡; Microbiology 105, 105L*‡; Nematology 110
Two courses in Advanced Ecology or Evolution 6-9
Evolution and Ecology 102, 103, 107, 115, 117*, 119*, 120, 131, 138, 141, 147, 149, 150, 180A* and 180B*, 181
Laboratory or field course: At least one of the courses taken to fulfill these requirements must include a laboratory or field component.
*Appropriate courses from the above lists are indicated with an asterisk.
*‡These courses cannot be taken without the corresponding lecture course. Additional courses, if necessary, from above course lists to reach 18 units.

Major Advisers. Students transferring to UC Davis from another institution and majoring in Evolution, Ecology and Biodiversity must consult an adviser immediately upon matriculation so that their transfer credits can be applied to the major requirements. All new students in the major should contact the Department of Evolution and Ecology office for adviser assignment. Substitutions of courses not on the above list for major requirements are arranged through the adviser.

Advising Center for the major is located in 2320 Storer Hall (530) 752-8523. Pre-professional students should establish contact with the Health Sciences Advising office in 111 South Hall, to learn what specific courses are required on their transcripts.

Teaching Credential Subject Representative. Students planning for a teaching career should consult the School of Education in regard to preparation for certification; see the Teaching Credential/M.A. Program on page 114.

Courses in Evolution and Ecology (EVE)

Lower Division Courses

2. Biodiversity (3)
Lecture—2 hours; lecture/discussion—1 hour. Introduction to nature, scope and geographical distribution of biodiversity (the diversity of life, with emphasis on plants and animals, especially insects).

Humans and biodiversity—domestication, aesthetics, ethics and valuation. Species richness and "success." Biodiversity through time; monitoring, evaluation and conservation. Biomes—global, continental and Californian. (Same course as Entomology 2.) GE credit: SciEng, Wrt.

11. Principles of Ecology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology recommended. Ecological principles with emphasis on humans and their interactions with the environment; how humans affect and depend on natural ecosystems; the future of the Earth's biosphere. GE credit: SciEng.—Toft

12. Life in the Sea (3)
Lecture—3 hours. Diversity of life in the sea; adaptations to physical/chemical ocean environment; marine science research methods; utilization of living marine resources by humans; factors and processes that influence diversity of sea life, including humans. Limited enrollment. GE credit: SciEng, Wrt.—III. Williams

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Evolution and Ecology. Internships supervised by a member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor.
(P/NP grading only.)

99. Special Study for Lower Division Students (1-5)
(P/NP grading only.)

Upper Division Courses

100. Introduction to Evolution (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; Biological Sciences 101; Mathematics 16A, 16B, 16C or the equivalent; Statistics 13 or 100 (Statistics 100 recommended). A general survey of the origins of biological diversity and evolutionary mechanisms.—I, II. (I, II, III.) Begun, Coop, Kopp, Langley, Turelli

101. Introduction to Ecology (4)
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; Mathematics 16A, 16B, 16C or the equivalent. A general survey of the principles of ecology.—I, II, III. (I, II, III.) Gaylord, Sanford, Schoener, Schreiber, Shapiro

101Q. Introduction to Computer Models in Ecology (1)
Autotutorial—1.5 hours; extensive problem solving—1.5 hours. Prerequisite: concurrent enrollment in course 101. Computational methods and mathematical models used to study ecological phenomena.

102. Population and Quantitative Genetics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 101, and Statistics 100 or 102, and course 100. Evolution as caused by random mating, genetic drift, natural selection, inbreeding, migration, and mutation in theory and actuality. The resemblance between relatives and consequences of selection for quantitative traits. Application of these ideas to topics such as the evolution of sex.—I. Langley

103. Phylogeny and Macroevolution (4)
Lecture—3 hours; lecture/discussion—3 hours. Prerequisite: course 100. Statistical inference of evolutionary patterns and processes above the species level. Topics include estimation of phylogenies and divergence times, character evolution, biogeographic history, and rates and patterns of lineage diversification, with an emphasis on the origin of species. Offered in alternate years.—(II.) Moore, Turelli

104. Community Ecology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or Environmental Science and Policy 100. Population growth and density dependence; predation; exploitative, interference and apparent competition; coexistence mechanisms; niches, spatial and temporal variation; stability, diversity, and productivity of food webs; applications to conservation and biological control. Emphasis on quantitative understanding through models, concepts, and empirical evidence.

105. Phylogenetic Analysis of Vertebrate Structure (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A and 1B, or 2B and 2C. The structure of the classes and subclasses of vertebrates is described and interpreted in terms of phylogeny.—I. Wainwright

106. Mechanical Design in Organisms (3)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours; fieldwork—3 hours. Prerequisite: upper division standing or consent of instructor; introductory animal biology (Biological Sciences 1B or 2B), invertebrate zoology (course 112), and/or ecology (course 101) are recommended; residence at or near Bodega Marine Lab required. Student must complete the application available at http://www.bml.ucdavis.edu. Explores fundamental principles in the form and function of organisms, examining how basic properties of size, shape, structure, and habitat constrain ways in which plants and animals interact and cope with their physical surroundings. Offered in alternate years.—IV. (IV.) Gaylord

107. Animal Communication (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1B or 2B; Animal Behavior course (Neurobiology, Physiology, and Behavior 102, Psychology 101, Animal Science 104, Entomology 104, or equivalent). How animals use songs, dances, colors, chemicals, electricity and vibrations to communicate. Mechanisms of signal production and detection (sensory systems), theory of information transfer and signal design, and the role of natural selection in shaping communication.—(I.) Patricelli

108. Systematics and Evolution of Angiosperms (5)
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C. Diversity and classification of angiosperms (flowering plants) on a world scale, and current understanding of the origin of angiosperms and evolutionary relationships and trends within them based on morphological and molecular evidence. (Same course as Plant Biology 108.) GE credit: SciEng.—III. (III.) Doyle

110. Running, Swimming and Flying (3)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours; fieldwork—3 hours. Prerequisite: upper division standing or consent of instructor; introductory animal biology (Biological Sciences 1B or 2B), invertebrate zoology (course 112), and/or ecology (course 101) are recommended; residence at or near Bodega Marine Lab required. Student must complete the application available at http://www.bml.ucdavis.edu. Examines the bases of organism movement in terrestrial, aquatic, and aerial environments, emphasizing both the unifying principles underlying locomotion, as well as a range of strategies employed across diverse groups of organisms.

111. Marine Environmental Issues (1)
Discussion—1 hour; seminar—2 hours. Prerequisite: upper division standing or consent of instructor. Concurrent enrollment in at least one course from Environmental Science and Policy 124, 152, course 106, 110, 114; residence at or near Bodega Marine Laboratory required. Student must complete the application available at http://www.bml.ucdavis.edu. An examination of critical environmental issues occurring in coastal waters. Course links together material from concurrent courses at BML to develop an integrative understanding of marine environments and their conservation. Includes readings, group discussions, and interaction with visiting speakers. May be repeated two times for credit. (Same course as Environmental Science and Policy 111.)—IV. (IV.) Gaylord, Sanford

112. Biology of Invertebrates (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1B, or 2B and 2C; courses in systematics, ecology, and evolution recommended. Survey of the invertebrate phyla, emphasizing aquatic forms, and focusing on morphology, development, natural history, ecology, and phylogenetic relationships. Limited enrollment.—(II.) Grosberg, Sanford

112L. Biology of Invertebrates Laboratory (2)
Laboratory—6 hours. Prerequisite: Biological Sciences 1B, or 2B and 2C; course 112 concurrently. Field and laboratory experience with representative members of the major invertebrate phyla discussed in course 112. Emphasis on comparative morphology, natural history, ecology, and behavior of living invertebrates. Two field trips required.—(II.) Grosberg, Sanford

114. Experimental Invertebrate Biology (3)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours; fieldwork—3 hours. Prerequisite: upper division standing or consent of instructor; introductory cell, animal and plant biology (Biological Sciences 1A, 1B and 1C), invertebrate zoology (Evolution and Ecology 112), ecology (Evolution and Ecology 101), and/or evolution (Evolution and Ecology 100) are recommended; residence at or near Bodega Marine Lab required. Student must complete the application available at http://www.bml.ucdavis.edu. The biology, ecology, and evolution of local marine invertebrates with a focus on adaptations to environmental and biological factors encountered on the California coast. Hands-on field and laboratory learning with an emphasis on generating and testing hypotheses.—IV. (IV.) Sanford

115. Marine Ecology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or Environmental Science and Policy 100 or Biological Sciences 2B, or consent of instructor. Processes affecting the distribution, abundance, and diversity of plant and animal life in the sea. Introduction to marine habitat diversity and human impacts on marine ecosystems.—II. Stachowicz

117. Plant Ecology (4)
Lecture—3 hours; fieldwork—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; Plant Biology 111 recommended. The study of the interactions between plants, plant populations or vegetation types and their physical and biological environment. Special emphasis on California. Four full-day field trips and brief write-up of class project required. (Same course as Plant Biology 117.)—I. (I.) Rejmanek

119. Population Biology of Weeds (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; introductory statistics recommended. Origin and evolution of weeds, reproduction and dispersal, seed ecology, modeling of population dynamics, interactions of weeds and crops, biological control. Laboratories emphasize design of competition experiments and identification of weedy species. (Same course as Plant Biology 119.) Not open for credit to students who have completed Plant Biology 121.—III. (III.) Rejmanek

120. Global Change Ecology (3)
Lecture/discussion—3 hours. Prerequisite: course 100 and 101 or equivalents. Treatment of historical evolution of the biosphere resulting from physical, chemical, and biological influences. Special focus upon changes caused by humans. Topics pertain to biodiversity, resources, conservation, and ecosystem services. Offered in alternate years.—III. Strong

131. Human Genetic Variation and Evolution (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1B or 2B. Introduction to genome-wide nucleotide sequence variation in human populations and computational methods for its analysis. Topics to include

forensics, disease gene mapping, and studies of human evolutionary history. Misuses, such as eugenics, and ethical/legal issues will be discussed.—(II.) Rannala

134. Herpetology (3)
Lecture—2 hours; term paper. Prerequisite: Biological Sciences 1A, 1B, or 2A, 2B, 2C; Evolution and Ecology 100 recommended. The world-wide diversity of amphibians and reptiles with emphasis on behavior, ecology, functional morphology, and evolutionary history. Offered in alternate years.—III. Shaffer

134F. Field Herpetology (2)
Fieldwork—5 hours; lecture/discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, or 2A, 2B, 2C; concurrent enrollment in course 134 and 134L. Multi-day field trips to major California habitats focus on identification of, and ecological experiments on, amphibian and reptile species. Students work in teams to plan experiments, collect and analyze data, write up results and give oral presentations to the class. Offered in alternate years.—III. Shaffer

134L. Herpetology Laboratory (2)
Laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, or 2A, 2B, 2C; course 134 concurrently. The diagnostic characteristics and functional attributes of amphibians and reptiles, emphasizing ecological, biogeographic and phylogenetic patterns. Field experience with common species of reptiles and amphibians in the Davis area. Offered in alternate years.—III. Shaffer

138. Ecology of Tropical Latitudes (5)
Lecture—3 hours; discussion—1 hour; extensive writing. Prerequisite: one course in Biological Sciences, Entomology, Wildlife, Fish, and Conservation Biology, Geography, or tropical experience, or consent of instructor. Biological, physical, and human-related aspects of the ecology of low latitudes. Distribution, numbers, and relationships of tropical organisms. Problems of development and conservation in the context of ecological and evolutionary theory. Offered in alternate years. GE credit: SciEng, Wrt.—III. Shapiro

140. Paleobotany (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C. Introduction to plant fossil record, beginning with invasion of land in the Silurian, emphasizing origin and evolution of major groups and adaptations and changing composition and distribution of floras in relation to plate tectonics and climatic change.—II. Doyle

141. Principles of Systematics (3)
Lecture—2 hours; independent study. Prerequisite: Biological Sciences 1B or 1C or 2B; course 100 recommended. Historical background, philosophical rationale, contemporary approaches, and working rules of biosystematics, including International Code of Zoological Nomenclature. Offered in alternate years. GE credit: SciEng, Wrt.—(III.) Shapiro

147. Biogeography (4)
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 1A and 1B, or 2B. Movements of terrestrial organisms. The role of geologic, climatic, and biologic changes in the geographic distribution of organisms. Offered in alternate years.—(I.) Shapiro

149. Evolution of Ecological Systems (4)
Lecture—3 hours; term paper. Prerequisite: course 101 or Environmental Studies 100 (or the equivalent), and course 100 (or the equivalent). Evolution as an organizing force in natural communities. Coadaptation in trophic and competitive relationships. Ecology of polymorphisms, clines, and speciation. Offered in alternate years.—I. Shapiro

150. Evolution of Animal Development (3)
Lecture—3 hours. Prerequisite: molecular and cellular biology 150 or 163 or equivalent course in developmental biology; may be waived for graduate students with consent of instructor. Comparative analysis of animal development and the genetic basis of morphological diversification. Offered in alternate years.—II. Kopp

175. Computational Genetics (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 101 and Statistics 100 or 102. The use of computers to solve problems in genetics and evolution. Introduction to a general purpose computer language (Python), computational statistical methods, and applications such as QTL mapping, linkage detection, estimation of rates of evolution, and gene finding.

180A-180B. Experimental Ecology and Evolution in the Field (4-4)
Lecture/laboratory—3 hours; fieldwork—3 hours. Prerequisite: course 100; course 101 or Environmental Science and Policy 100. Experimental design in field ecology. Students will critique primary literature, design project, gather and analyze data. Students required to write original research paper based on field experiments. Offered in alternate years. (Deferred grading only pending completion of sequence.)

181. Ecology and Evolution of Animal-Plant Interactions (4)
Lecture—1.5 hours; lecture/discussion—1.5 hours; term paper; extensive writing or discussion. Prerequisite: Biological Sciences 2B and 2C required, 2C may be taken concurrently. Animal adaptations for eating plants, pollinating flowers, dispersing seeds. Plant adaptations to herbivore defense, attraction of mutualists; role of coevolutionary arms race, mutualists and cheaters in plant/animal speciation. Exploration through lectures, original scientific literature, discussions and term paper. Offered in alternate years.—I. Strauss

189. Introduction to Biological Research (1)
Discussion—1 hour. Prerequisite: upper division standing in Evolution and Ecology or related biological science; consent of instructor. Introduction to research methods in biology. Presentation and discussion of research by faculty, graduate, and undergraduate students. May be repeated for credit up to a total of 3 units. (P/NP grading only.)—I, II, III. (I, II, III.)

190. Undergraduate Seminar (2)
Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.) Shapiro

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Evolution and Ecology. Internships supervised by a member of the faculty. (P/NP grading only.)

194HA-194HB-194HC. Research Honors
Laboratory—6 hours. Prerequisite: Students who have completed 135 units and qualify for the honors program (as defined by the current catalog). Students pursue intensive research under the guidance of a faculty adviser. Students are expected to complete the full three-quarter sequence culminating in the writing of an honors thesis. (Deferred grading only, pending completion of sequence.)

197T. Tutoring in Biological Sciences 2B (1-2)
Tutorial—3-6 hours. Prerequisite: Biological Sciences 1B or Biological Sciences 2B with a grade of B or better. Assisting the instructor by tutoring students in a Biological Sciences 2B laboratory. Tutoring is voluntary and is supervised by a Laboratory Teaching Assistant and the Biological Sciences 2B Laboratory Coordinator. May be repeated three times for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

210. Molecular Phylogenetic Analysis (3)
Lecture—2 hours; laboratory—3 hours. Theory and practice of inferring phylogenetic trees using molecular sequence data. Practical techniques for obtaining sequence data, advantages and disadvantages of common approaches for inferring trees, statistical methods for comparing alternative hypotheses. (Same course as Nematology 210.) Offered in alternate years.—Nadler

211. Applied Phylogenetics (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 103 or 210 or Population Biology 200C or the equivalent, graduate standing. Applications of phylogenetic methods to fields outside of systematics. Core lectures/labs in remedial phylogenetics, phylogeography, conservation and comparative morphology. Special topics vary yearly. May be repeated one time for credit.—II. (II.) Moore, Shaffer, Wainwright

220. Species and Speciation (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 100, Philosophy 108 or the equivalent; History and Philosophy of Science 130B recommended. Current status of species concepts, models of speciation, current research on speciation, and relevance of species to conservation biology. Offered in alternate years.—II. Shapiro

231. Principles of Biological Data Analysis (3)
Lecture—2 hours; laboratory—3 hours. Introduction to the principles of data analysis, experimental design, statistical modeling, inference, and hypothesis tests. Statistical methods of particular importance in biological applications will be emphasized. Examples will be presented from the fields of ecology and evolutionary genetics. (S/U grading only.)—I. Rannala

240. Paleobotany and Angiosperm Evolution (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Biology 108, 116, or course 140. Critical analysis of the plant fossil record as a source of evidence on origin, evolution, and phylogeny of the angio-sperms, Cretaceous and Tertiary climates, geographic history of modern taxa, and origin of modern vegetation types. Offered in alternate years.

290C. Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Presentation and discussion of faculty and graduate student research in biology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Course

390. Methods of Teaching (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching. Includes analyses of texts and supporting material, discussion of teaching techniques and preparing and conducting of laboratory and discussion sections. May be repeated for credit for a maximum of 8 units. (S/U grading only.)—I, II, III. (I, II, III.)

Exercise Biology

See Neurobiology, Physiology, and Behavior, on page 431.

Exercise Science (A Graduate Group)

The Exercise Science program is not currently accepting new students.

Charles L. Stebbins, Ph.D., Chairperson of the Group

Group Office. 310 Life Sciences
(530) 752-2981; *http://biosci2.ucdavis.edu/ggc/exs/*

Faculty

Sue Bodine, Ph.D., Professor
(Neurobiology, Physiology & Behavior)
George Brooks, Ph.D., Professor
(Integrative Biology-UC Berkeley)
Gretchen Casazza, Ph.D., Research Director
(Sports Medicine)
Chao-Yin Chen, Ph.D., Adjunct Professor
(Med: Biochemistry and Molecular Medicine)
Youngran Chung, Ph.D., Assistant Research Biochemist *(Med: Pharm & Tox)*
Fadi Fathallah, Ph.D., Associate Professor
(Biological and Agricultural Engineering)
Charles A. Fuller, Ph.D., Professor
(Neurobiology, Physiology, and Behavior)
Samantha Harris, Ph.D., Assistant Professor
(Neurobiology, Physiology, and Behavior)
Dave Hawkins, Ph.D., Professor
(Neurobiology, Physiology & Behavior)
Martin D. Hoffman, M.D., Associate Physician Diplomate *(Med: Phys Med & Rehab)*
Robert G. Holly, Ph.D., Senior Lecturer
(Neurobiology, Physiology & Behavior)
James H. Jones, Ph.D., Professor
(Surgical and Radiological Sciences)
Thomas Jue, Ph.D., Professor
(Med: Biochemistry and Molecular Medicine)
Ulrike Kreutzer, Ph.D., Assistant Adjunct Professor
(Med: Biochemistry and Molecular Medicine)
Marta Van Loan, Ph.D., Associate Adjunct Professor
(Nutrition)
Craig M. McDonald, Ph.D., Professor
(Physical Medicine and Rehabilitation)
Edward S. Schelegle, Ph.D., Associate Professor
(Anatomy, Molecular, Cellular, and Integrative Physiology)
Charles Stebbins, Ph.D., Professor
(Internal Medicine)
Susan M. Stover, Ph.D., Professor
(Anatomy, Physiology and Cell Biology)
Keith R. Williams, Ph.D., Professor
(Neurobiology, Physiology & Behavior)
John C. Wingfield, Ph.D., Professor
(Neurobiology, Physiology & Behavior)

Graduate Study. The Graduate Group in Exercise Science offers a program of study and research leading to an M.S. degree. Advanced training is provided in two areas of emphasis. The Exercise Physiology Area involves the study of functional, metabolic, nutritional, and regulatory aspects of the cardiovascular, respiratory, and skeletal muscle systems as they relate to movement and exercise. The Biomechanics Area includes the study of skeletal muscle mechanics, motor control, biomechanical analysis of human movement, tissue mechanics, motor control, and clinical biomechanics.

Graduate Advisers. C. Stebbins, D. Hawkins, G. Casazza

Courses in Exercise Science (EXS)

Graduate Courses

200. Introduction to Research in Exercise Science (3)
Discussion—2 hours; seminar—1 hour. Prerequisite: graduate standing in Exercise Science or consent of instructor. Principles of scientific research in Exercise Science: scientific method, literature review, experimental design, hypotheses formulation, data collection, analysis, inferences, biases, human subject and animal protocols, ethics.—I. Jue

201. Exercise Cardiorespiratory Physiology (3)
Lecture/discussion—3 hours. Prerequisite: undergraduate course in systemic physiology, exercise physiology, and biochemistry (intermediary metabolism). Advanced course on integrated responses of the cardiovascular and respiratory systems to exercise. Includes hemodynamic, neurohormonal, and autonomic aspects of cardiac and vascular function, principles of myocardial metabolism, and mechanisms underlying changes in pulmonary function and gas transport.—I. Stebbins

206. Exercise Metabolism (3)
Lecture/discussion—3 hour. Prerequisite: undergraduate course in metabolism (Biological Sciences 103, Nutrition 101) or consent of instructor. The integrated metabolic response to exercise. Includes bioenergetics and metabolic regulation of skeletal muscle, and role of cardiovascular, respiratory, hemodynamic, and neurohormonal control.—III. Jue

210. Introduction to Human Performance Testing (2)
Discussion—1 hour; laboratory—3 hours. Introduction to human exercise testing and measurement. Safety procedures and measurement capabilities of the Human Performance Laboratory at UC Davis. Potential areas for graduate research.—I. (I.) Shaffrath

221. Anthropometry in Physical Activity (3)
Lecture—2 hours; laboratory—five 3-hour sessions to alternate weekly with five 1-hour discussion sessions. Prerequisite: Exercise Biology 101 and 102. Consideration of physical constitution, body proportions, and body composition in man as they affect physical performance, and of body structural and compositional changes accompanying prolonged, systematic physical conditioning.

222. Metabolic Functions in Exercise (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Exercise Biology 102, Neurobiology, Physiology, and Behavior 101. Review of the current research literature on the metabolic responses to exercise in man; a laboratory survey of respiratory response, metabolic and water balances, blood gas adjustments and acid-base balance with particular reference to the effect of environmental conditions.

224. Exercise Electrocardiography (2)
Lecture—2 hours. Prerequisite: Exercise Biology 112 or consent of instructor. Physiological bases and clinical implications of normal and abnormal exercise electrocardiograms (ECG) are treated in detail. Exercise prescription is considered as is the predictive significance of normal and abnormal ECG.

225. Seminar in Cardiac Rehabilitation (2)
Seminar—2 hours. Prerequisite: Exercise Biology 112 or graduate standing and consent of instructor. Critical examination of literature dealing with the causes, prevention and treatment of cardiovascular disease with particular emphasis on intervention through cardiac rehabilitation. Both the theoretical bases and practical approaches to cardiac rehabilitation will be examined.

227. Research Techniques in Biomechanics (4)
Lecture—2 hours; laboratory—4 hours; term paper/discussion—1 hours. Prerequisite: consent of instructor, Mathematics 22B; Exercise Biology 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques evaluated include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional videography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as Biomedical Engineering 227/Mechanical and Aeronautical Engineering 227.)—II. (II.) K. Williams

228. Skeletal Muscle Mechanics: Form, Function, Adaptability (4)
Lecture—4 hours. Prerequisite: basic background in biology, physiology, and engineering; Engineering 35 and 45, Mathematics 21D; and Neurobiology, Physiology, and Behavior 101 recommended. Basic structure and function of skeletal muscle examined at the microscopic and macroscopic level. Muscle adaptation in response to aging, disease, injury, exercise, and disuse. Analytic models of muscle function. (Same course as Biomedical Engineering 228.)—(I.) Hawkins

290. Seminar in Exercise Science (1)
Seminar—1 hour. Prerequisite: graduate standing; required of all first year students for first two quarters. Presentation and discussion of topics of interest, and the analysis of research in exercise science. Not open for credit to students who have taken Physical Education 290. (S/U grading only.)—(II, III.)

290C. Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing. Student presentations of research in Exercise Science and discussions among participating students and faculty. May be repeated for credit. (S/U grading only.)—I, II, III.

298. Group Study (1-5)
Prerequisite: graduate standing; consent of instructor.

299. Research (1-12)
Prerequisite: graduate standing; consent of instructor and Department Chairperson. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

Family and Community Medicine

See Medicine, School of, on page 380.

Feminist Theory and Research

Amina Mama Ph.D., Program Director

Program Office. 2222 Hart Hall
(530) 752-4686;
http://wms.ucdavis.edu/wgssite/

Graduate Study. The Woman and Gender Studies Program at UC Davis offers a Designated Emphasis in Feminist Theory & Research with graduate programs in: Anthropology, Comparative Literature, Cultural Studies, Education, English, French, German, Geography, History, Native American Studies, Performance Studies, Psychology, Sociology, and Spanish.

The Designated Emphasis in Feminist Theory & Research allows graduate students to receive a Ph.D. in the field of their choice while completing a special emphasis in feminist theory & scholarship. The courses listed for the Designated Emphasis are open to all graduate students in good standing. Completed undergraduate level studies in Feminist Theory and Methodology or the equivalent are required. Graduates in affiliated departments who complete the Designated Emphasis requirements will receive official credit on their transcripts for a Ph.D. with "Special Emphasis in Feminist Theory & Research."

Students must complete all the requirements for the Ph.D. in their home department. The requirements for the Designated Emphasis in Feminist Theory and Research are the successful completion of the two core courses, Women's Studies 200A and Women's Studies 200B, and two additional courses focusing on women and gender, one in the student's home department and one outside their home department.

A member of the DE affiliated faculty must be a member of the student's qualifying examination. Analysis of gender is expected to be a central component of both the student's qualifying examination and doctoral research.

Students should consult with the Chair of the Designated Emphasis in Feminist Theory & Research before enrolling in a graduate course for which they wish to receive credit to ensure that it will count toward fulfilling the requirements of the Designated Emphasis. If possible, please bring a copy of the syllabus or an expanded course description to your meeting.

Graduate Adviser. Contact Liz Constable in 162 Kerr Hall (530) 752-5228; elconstable@ucdavis.edu.

Fiber and Polymer Science

(College of Agricultural and Environmental Sciences)

Faculty. See under Textiles and Clothing, on page 506.

The Major Program

The Fiber and Polymer Science major is concerned with the physical, chemical, and structural properties of fibers and polymers and how these relate to fiber and polymer performance and end-use.

The Program. All students in this major take a common core of course work in chemistry, physics, and mathematics, and depth subject matter in fiber and polymer science, organic and physical chemistry, and technical writing. In the restricted electives, students select courses from areas such as computer science and mathematics, chemistry, marketing and management, material and advanced fiber and polymer science, and textiles.

Career Alternatives. The major prepares the student for a career in a wide range of industries in the areas of research and development, technical marketing and management, production, quality control, and science teaching (on completion of an additional year in the teaching credential program). The companies employing Fiber and Polymer Science graduates are in the fiber, polymer, industrial product, textile and/or chemical business. Graduates are prepared to enter the graduate program in textiles or agricultural and environmental chemistry with a specialization in fiber and polymer chemistry, and fiber and polymer science programs at other universities.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 52-55

- Chemistry 2A-2B-2C 15
- Computer Science Engineering 15 or 30 4
- Mathematics 16A-16B-16C or 21A-21B-21C 9-12
- Physics 7A-7B-7C or 9A-9B-9C 12
- Statistics 13 or Plant Sciences 120 4
- Textiles and Clothing 6 and 8 or Engineering 45 8

Depth Subject Matter 37-39

- Textiles and Clothing 163, 163L 4
- Fiber and Polymer Science 100, 150, 161, 161L, 180A, 180B 14
- Chemistry 128A, 128B, 128C, 129A, 129B, 110A and 110C or 107A and 107B 19-21

Restricted Electives 30

Select courses from the following:

- *Computer Science and Mathematics:* Plant Sciences 21; Applied Science Engineering 115, 116; Mathematics 22A, 22B
- *Chemistry:* Chemistry 108, 115, 120, 121, 124A, 124B, 124C, 131, 140
- *Marketing/Management:* Agricultural and Resource Economics 100A, 100B, 113, 136, 157, Economics 1A, 1B, Statistics 103
- *Material and Advanced Fiber/Polymer Science:* Aeronautical Science Engineering 137, Engineering 104, 104L, Textiles and Clothing 250A-F, 290, 293
- *Textiles:* Textiles and Clothing 162, 162L, 164, 165, 173, 174

Total Units for the Degree 119-124

Major Adviser. Y. L. Hsieh *(Textiles and Clothing)*

Advising Center for the major is located in 129B Everson Hall (530) 752-4417.

Minor Program Requirements:

UNITS

Fiber and Polymer Science 18

- Textiles and Clothing 6 or Engineering 45 4
- Courses selected from the following: Fiber and Polymer Science 100, 150, 161, 161L, 180A and 180B; and Textiles and Clothing 163 and 163L 14

Minor Adviser. Y. L. Hsieh

Courses in Fiber and Polymer Science (FPS)

Upper Division Courses

100. Principles of Polymer Materials Science (3)

Lecture—3 hours. Prerequisite: Chemistry 2A-2B; Chemistry 8A-8B or Engineering 45; introductory physics. The basic principles of polymer science are presented including polymer structure and synthesis; polymerization mechanisms, polymer classes, properties, and reactions; polymer morphology, rheology, and characterization; polymer processing. (Same course as Materials Science Engineering 147.)—II. (II.) Pan

110. Plastics in Society and the Environment (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 10 or introductory course in physical sciences. Basic concepts and methodologies in the study of plastics. Formation, classification, structure, properties, processing, and formulation. Their application to societal needs, and their impact on society and the environment. GE credit: SciEng or SocSci, Wrt.

150. Polymer Syntheses and Reactions (3)

Lecture—3 hours. Prerequisite: Chemistry 128B or 8B, and Chemistry 107A. Organic and physical chemistry aspects of polymer syntheses and reactions including polymerization mechanisms, kinetics and thermodynamics for major types of organic high polymers.—III. (III.) Hsieh

161. Structure and Properties of Fibers (3)

Lecture—3 hours. Prerequisite: Textiles and Clothing 6 and Chemistry 8B. The structure, properties and reactions of natural- and man-made fibers; the relations between molecular structure of fibers and their physical properties; interactions of fibers and detergents.—I. (I.) Hsieh

161L. Textile Chemical Analysis Laboratory (1)

Laboratory—3 hours. Prerequisite: course 161 (may be taken concurrently). Laboratory methods and procedures employed in qualitative and quantitative analysis of textile fibers and auxiliaries.—I. (I.) Hsieh

180A-180B. Introduction to Research in Fiber and Polymer Science (2)

Laboratory/discussion—6 hours. Prerequisite: senior standing in major related to Fiber and Polymer Science, and consent of instructor. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. (Deferred grading only, pending completion of sequence.)—I, II, III. (I, II, III.)

192. Internship in Fiber and Polymer Science (1-12)

Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off campus in a fiber and polymer science related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.)

197T. Tutoring in Fiber and Polymer Science (1-5)

Tutorial—3-15 hours. Prerequisite: upper division fiber and polymer science related major and consent of instructor. Tutoring of students in Fiber and Polymer Science courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring in another Fiber and Polymer Science course. (P/NP grading only.)

198. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Courses

250A-F. Special Topics in Polymer and Fiber Science (3)

Lecture—3 hours. Prerequisite: Fiber and Polymer Science 100 or consent of instructor. Selected topics of current interest in polymer and fiber science. Topics will vary each time the course is offered. (Same course as Materials Science and Engineering 250A-F.)—I, III. (I, III.) Hsieh, Pan, Sun

299. Research (1-12)

Independent study—3-36 hours. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)

Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Film Studies

(College of Letters and Science)

_____, Ph.D., Program Director

Program Office. 209 Sproul Hall (530) 752-4999; http://filmstudies.ucdavis.edu

Committee in Charge

Moradewun Adejunmobi, Ph.D. *(African and African-American Studies*
Emily Albu, Ph.D. *(Classics)*
Elizabeth Constable, Ph.D. *(Women & Gender Studies)*
Jesse Drew, Ph.D. *(Technocultural Studies)*
Jaimey Fisher, Ph.D. *(German and Russian)*
Margherita Heyer-Caput, Ph.D. *(Italian)*
Pablo Ortiz, Ph.D. *(Music)*
Scott Simmon, Ph.D. *(English)*
Eric Smoodin, Ph.D. *(American Studies)*
Julie Wyman, Ph.D. *(Technocultural Studies)*

The Major Program

This interdisciplinary major takes one of the most influential art forms of the twentieth century and today—film—as its object of study. The field of Film Studies addresses the history, theory, and culture of this art form and asks questions about film texts themselves: modes of production (including everything

from filmmakers' aesthetic choices to the role of the global economy); historical, national, and cultural contexts; and spectators and audiences. Questions of gender, race, sexuality, and nationality, in all of these areas, have been central to Film Studies almost since its inception and continue to shape much of the work in the field. While the program emphasizes film history, criticism, and theory, students also have opportunities to explore film/video production.

The Program. Students majoring in Film Studies take upper-division courses in film history and film theory, as well as in at least three of five general areas of study. Students also develop a thematic emphasis, in consultation with an advisor, that draws on courses from at least two different departments/programs and that allows them to pursue their particular interests within the field of Film Studies. Students have the option of completing a senior thesis (either a written paper or an original film/video) within this emphasis.

Career Alternatives. The A.B. degree in Film Studies prepares students for a variety of careers in media industries: for example, local and national film and television production companies, local television newsrooms, community television stations, computer graphic companies, advertising and marketing companies, public relations departments, and film distribution companies. Students wishing to pursue graduate work will be prepared to go on in film studies, as well as a variety of other fields that draw on interdisciplinary study: for example, American studies, English, literatures and languages, drama, communication, computer science, cultural studies, women and gender studies, and ethnic studies programs. Many film students also choose to go on to law school, and the analytical skills, writing abilities, and familiarity with theoretical thought developed through the film major prepare them well for the study and practice of law.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter..... 20-40

Film Studies 1 4
A four-course sequence in a single language or equivalent 0-20
One course from African American and African Studies 15, 50; American Studies 1A, 21, 30; Art History 5; Art Studio 30; Chicana/o Studies 50, 60; Design 1; French 50; Humanities 60; Italian 50; Japanese 25; Native American Studies 32; Textiles and Clothing 7; Women's Studies 20, 25..... 4
One course from African American and African Studies 10, 15, 50; Asian American Studies 1, 2; Chicana/o Studies 10, 50, 60; Native American Studies 1, 10, 32, 33; Women's Studies 20, 25, 50, 70, 80..... 4
Two courses from Art History 1A, 1B, 1C, 1D; Asian American Studies 2; Chinese 10, 11; Classics 10; Comparative Literature 3, 4, 5, 6, 7; Dramatic Art 1, 20; English 43, 44; German 48; History 4C, 10C, 17B, 72B; Humanities 5, 6; Japanese 10; Music 10, 28; Native American Studies 33; Russian 41, 42..... 8
Note: One of these two courses may be from Design 15, 16 or Dramatic Art 10, 21A, 21B, 24.

Depth Subject Matter 36-40

One course from English 161A, 161 B or Film Studies 124..... 4
One course from English 162; Film Studies 127; Philosophy 127; Women and Gender Studies 162..... 4
One course each from three of the following topic areas: Cinematic Traditions and Movements, Visual and Popular Culture, Gender/Sexuality/Class, Race/Ethnicity/Class, Production and Performance 12
A current list of approved classes is available from the Program office and from the faculty adviser.
16-20 units in one of the two breadth areas not used to satisfy the breadth requirement, or development of a thematic area in consultation with a faculty adviser..... 16-20
Qualified students who complete 20 units and have an overall GPA of 3.500 may choose the senior thesis option (194H-196H) for 8 of those 20 units.
No course may be counted for more than one requirement for the major.

Total Units for the Major 56-80

Major Advisers. _____

Minor Program Requirements:

UNITS

Film Studies 24

Film Studies 1 4
Upper division courses selected from the following list, with no more than two courses from any one category 20
(a) Problems and Themes in Cinema: Anthropology 136, Classics 102, Dramatic Art 115, English 160, 161A, 161B, 162, Film Studies 124, 125, Women's Studies 162
(b) Cinema, Nation and Nationality: German 119, 142, Film Studies 176A, 176B, Italian 150, Japanese 106, Russian 129, Spanish 148
(c) Film and Social Identities: African American and African Studies 170, 171, Film Studies 120, Jewish Studies 120, Women's Studies 160, 164
(d) Film/Video Production: Art Studio 116, 117, 150
(e) Popular and Visual Culture: American Studies 130, 132, 133, 139, Art Studio 150, Communication 140, Political Science 165, Textiles and Clothing 107, Women's Studies 139
Restrictions: No more than two courses from a single department or program may be offered in satisfaction of the minor requirements.
Note: With a minor advisor's prior approval, up to four units of internship (e.g., American Studies 192, Communication 192, or Women's Studies 192) in television/video/film production may be offered toward satisfying the requirements of the minor. Such courses will be considered part of the "Film/Video Production" category.

Courses in Film Studies (FMS)

Lower Division Courses

1. Introduction to Film Studies (4)
Lecture—2 hours; discussion—1 hour; film viewing—3 hours. Analysis of film form and narrative, including cinematography, editing, and sound. Issues in film studies, including authorship, stardom, race, gender, class, and cultural identity. Includes introduction to selected cinematic movements and national film traditions. Not open for credit to students who have completed Humanities 10. GE credit: ArtHum, Wrt.—I, II, III. (I, II, III.) Constable, Fisher, Lu, Smoodin, Wyman

90X. Lower Division Seminar (4)
Seminar—4 hours. Prerequisite: lower division standing and consent of instructor. Study of a special topic in film studies in a small class setting. May be repeated for credit if topic differs. (P/NP grading only.)—I, II, III. (I, II, III.)

92. Internship (1-12)
Internship—3-36 hours. Supervised internship off and on campus in areas of Film Studies. May be repeated for credit. (P/NP grading only.)

98. Directed Group Study (1-5)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

120. Italian-American Cinema (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1. Exploration of representations of Italian-American identity in American (U.S.) cinema. Analysis of both Hollywood and independently produced films, especially as they represent ethnicity, gender, and social class of Italian Americans. Not open for credit to students who have completed Humanities 120. GE credit: ArtHum, Div, Wrt.—III. (III.) Heyer-Caput, Schiesari

121. New Italian Cinema (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1 and upper-division standing, or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. Offered in alternate years. (Same course as Italian 121.) GE credit: ArtHum, Div, Wrt.—III. Heyer-Caput

124. Topics in U.S. Film History (4)
Lecture—3 hours; film viewing—3 hours. Prerequisite: course 1. Study of an aspect of American film history (such as the silent era; the studio system; U.S. avant-garde cinema), including the influences of technological, economic, regulatory, cultural, and artistic forces. Not open for credit to students who have completed Humanities 124 unless topic differs. May be repeated two times for credit if topic differs. GE credit: ArtHum, Wrt.—III. (III.) Clover, Fisher, Simmon

125. Topics in Film Genres (4)
Lecture—3 hours; film viewing—3 hours. Prerequisite: course 1. A study of one or more of the film genres (such as the documentary, the musical, film noir, screwball comedy, or the western), including genre theory and the relationship of the genre(s) to culture, history, and film industry practices. Not open for credit to students who have completed Humanities 125 unless topic differs. May be repeated two times for credit if topic differs. GE credit: ArtHum, Wrt.—II. (II.) Clover, Constable, McConnell, Simmon, Smoodin

127. Film Theory (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1 or consent of instructor. Survey of the conceptual frameworks used to study film (including semiotics, psychoanalysis, spectatorship, auteur, genre and narrative theories). Historical survey of major film theorists. GE credit: ArtHum, Wrt.—III. (III.) Constable

129. Russian Film (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: completion of Subject A requirement. History of Russian film; film and social revolution, the cult of Stalin, dissident visions; film and the collapse of the Soviet empire; gender and the nation in Russian film. Course taught in English; films are in Russian with English subtitles. Offered in alternate years. (Same course as Russian 129.) GE credit: ArtHum, Div, Wrt.—II.

142. New German Cinema (4)
Lecture/discussion—3 hours; extensive writing. German filmmakers of the 1960s-1980s such as Fassbinder, Herzog, Syberberg, Brückner, Schlöndorf, Kluge, Wenders. Knowledge of German not required. May be repeated for credit with consent of instructor. (Same course as German 142) GE credit: ArtHum, Wrt.—I. (I.) Fisher

176A. Classic Weimar Cinema (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: Humanities 1. German Weimar (1919-1933) cinema. Fritz Lang, F.W. Murnau, and G.W. Pabst among others. Influence on world-wide (esp. Hollywood) film genres such as film noir, horror, science fiction, and melodrama. Not open for credit to students who have completed Humanities 176. Offered in alternate years. (Same Course as German 176A.) GE credit: ArtHum, Wrt.—I. Fisher

176B. Postwar German Cinema (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1. Exploration of German cinema from 1945 to 1980, when the Nazi past was a central theme. Includes study of postwar "rubble films," escapist "homeland films," and New German Cinema of the 1970s (including films by Fassbinder,

Kluge, Syberberg, and Herzog). Not open for credit to students who have completed Humanities 177. Offered in alternate years. GE credit: ArtHum, Wrt.—II.

189. Special Topics in Film Studies (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1, upper division standing, or consent of instructor. Group study of a special topic in film, focusing on a national tradition, a major filmmaker, or a specific era. May be repeated three times for credit. GE credit: Wrt.—I, III. (I, III.) Clover, Constable, Fisher, Heyer-Caput, Lu, Simmon, Smoodin

190X. Upper Division Seminar (4)
Seminar—4 hours. Prerequisite: upper division standing or consent of instructor. Study of a special topic in film studies in a small class setting. May be repeated for credit if topic differs. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship (1-12)
Supervised internship off and on campus in areas of Film Studies. May be repeated for credit. (P/NP grading only.)

194H. Special Study for Honors Students (1-5)
Variable—1-5 hours; independent study—3-15 hours. Prerequisite: senior standing; GPA of at least 3.500; consent of instructor. Guided research on a topic in Film Studies in preparation for the writing of an honors thesis in course 195H or the creation of an honors project in course 196H. May be repeated two times for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

195H. Honors Thesis (1-5)
Independent study—3-15 hours. Prerequisite: course 194H and consent of instructor; GPA of at least 3.500; senior standing. Writing of an honors thesis on a topic in Film Studies under the direction of a faculty member. May be repeated two times for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

196H. Honors Project (1-5)
Project—3-15 hours. Prerequisite: course 194H and consent of instructor; GPA of at least 3.500; senior standing. Creation of an honors film, video, or mixed-media project under the direction of a faculty member. May be repeated two times for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

197T. Tutoring in Film Studies (1-5)
Tutorial—3-15 hours. Prerequisite: consent of program director. Leading of small voluntary discussion groups affiliated with one of the Program's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit (S/U grading only.)

Fisheries

See Animal Science, on page 150; Biological and Agricultural Engineering, on page 175; and Wildlife, Fish, and Conservation Biology, on page 533.

Food Science

College of Agricultural and Environmental Sciences)

The Major Program

Food science applies chemical, physical, biological, engineering, and social sciences to processing, preservation, development, packaging, storage, evaluation, identity and utilization of foods.

The Program. Students majoring in food science spend the first two years of study developing the scientific and general background necessary for upper division study. The science courses include chemistry, biology, physics, and mathematics. General background is provided by courses in the social science/humanities area and by optional courses in introductory food science. At the upper division level, students take courses in nutrition, food microbiology, food chemistry, food analysis, food commodities, food processing, and food engineering, and may choose to specialize in one of seven career-oriented options. The major, including all seven options, is accredited by the Institute of Food Technologists. Students enrolled in the program are eligible for various scholarships, including scholarships from the Institute of Food Technologists.

Career Alternatives. Opportunities for employment include positions in the food and allied industries, local, state, and federal government agencies, and educational and research institutions. Graduate study for the food science student may lead to the M.S. or Ph.D. degree in food science, or in related fields such as agricultural chemistry, biochemistry, engineering, microbiology, and nutrition.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 54-74
- University Writing Program 102F, 104A, or 104E (if not already taken to satisfy college English requirement) 4
- Communication 1 (if not already taken to satisfy college English Requirement) 4
- Mathematics 16A-16B-16C 9
- Biological Sciences 1A, 1C or 2A, 2B, 2C 10-14
- Chemistry 2A-2B-2C 15
- Organic chemistry (see option for requirement)
- Physics 7A-7B-7C 12
- Food Science and Technology 1 and/or 10; both recommended, but not required 3-6
- Food Science and Technology 50 3
- Nutrition 10 (or approved substitute) 3
- Statistics 13 4

Depth Subject Matter 49
- Biological Sciences 102, 103 6
- Food Science and Technology 100A, 100B, 101A, 101B, 103, 104, 104L, 160, 190 28
- Food Science and Technology 110A-110B, Applied Biological Systems Technology 110L 8
- Food Science and Technology 117 3
- Food Science and Technology 127 or 107 4

Select one of the following five options:

Food Technology Option

The Food Technology option provides a broad exposure to food chemistry, food microbiology, food engineering and food processing. Students find positions in quality assurance, product development, and food processing in the food industry.

Specific course requirements 11
- Chemistry 8A-8B 6
- Food Science and Technology 108, 109 5

Selected additional courses 15
Select courses from a master list available from the department Advising Center.

Food Business and Management Option

The Food Business and Management option allows students to integrate study of the science and technology of food with that of business and economics in a unique program. Students prepare for positions of management in small food companies, and research-and-development oriented marketing or technical sales opportunities in corporate food industries.

Specific course requirements 24
- Chemistry 8A-8B 6
- Economics 1A 4
- Agricultural and Resource Economics 112, 113 8
- Management 100 3
- Food Science and Technology 109 3

Selected additional courses 10
Select courses from a master list available from the department Advising Center.

Consumer Food Science Option

The Consumer Food Science option prepares students for jobs in food product formulation, research-and-development oriented marketing and sensory analysis, quality assurance, extension service, creative writing, and community service. Students who fulfill the requirements for the teaching credential teach elementary or secondary school home economics.

Specific course requirements 19
- Chemistry 8A-8B 6
- Food Science and Technology 47, 109, 159 6
- Additional Food Science and Technology 107 or 127 4
- Consumer Science 100 3

Selected additional courses 10
Select courses from a master list available from the department Advising Center.

Brewing Science Option

The Brewing Science option prepares students for careers in production or quality assurance within the brewing industry or other food fermentation industries (e.g., other alcoholic beverages, vinegar and cheese). The option also prepares students for graduate study in food science. The option exposes the students to a diversity of coursework, including chemistry, biochemistry, microbiology and engineering as they pertain to the malting and brewing processes. Issues of quality assurance, plant sanitation and packaging are also key. Of course, there is a thorough grounding in malting and brewing.

Specific course requirements 26-29
- Chemistry 8A, 8B 6
- Food Science and Technology 3 (recommended but not required) 3
- Food Science and Technology 102A, 102B, 108, 109, 123, 131 20

Selected additional courses 9
Select courses from a master list available from the department Advising Center

Food Biology/Microbiology Option

The Food Biology/Microbiology option is for students interested in research and development careers with food companies or government laboratories, in teaching and research at academic institutions, or in professional (medical, veterinary, pharmacy, optometry or dental) school. This option prepares students for graduate study and research in several areas, including food science, biochemistry, biotechnology, microbiology, and post-harvest biology.

Specific course requirements 18-24
- Biological Sciences 1B or 2B 5
- Chemistry 8A-8B or 118A-118B-118C 6-12
- Microbiology 102, 102L 7

Selected additional courses 10
Select courses from a master list available from the department Advising Center.

Food Biochemistry Option

The Food Biochemistry option prepares students for graduate study and research in food science, biochemistry, biotechnology, microbiology, pharmacology, post-harvest biology, and commodity emphasis. The program is designed for students interested in graduate or professional school, leading to careers in research in universities, food companies or government laboratories or in teaching at academic institutions. The option can also serve to prepare students for professional schools such as pharmacy, optometry, dentistry, public health or medicine.

Specific course requirements..... 31

Biological Sciences 1B or 2B..... 5
Biological Sciences 104..... 3
Chemistry 118A-118B-118C..... 12
Chemistry 107A, 107B..... 6
Food Science and Technology 123, 123L 5

Selected additional courses..... 9

Select courses from a master list available from the department Advising Center

Food Chemistry Option

The Food Chemistry option prepares students for graduate study and research in such areas as flavor chemistry, food additive chemistry, biotechnology, biochemistry and toxicology. This option is for students interested in research and development careers with food companies or government laboratories, in teaching and research at academic institutions, or in professional (medical, veterinary, or dental) school.

Specific course requirements..... 20-21

Chemistry 118A-118B-118C or 128A-128B-128C, 129A..... 11-12
Chemistry 107A-107B, 124A..... 9

Selected additional courses..... 10

Select courses from a master list available from the department Advising Center.

Unrestricted Electives ..... varies by option

Total Units for the Degree 180

Major Adviser. C. F. Shoemaker *(Food Science and Technology)*

Advising Center for the major is located in 1206 RMI South Building (530) 754-8368.

Graduate Study. A program of study and research leading to the M.S. and Ph.D. degrees in Food Science is available (see below). For further information on graduate study, contact the graduate adviser.

Food Science (A Graduate Group)

Gary M. Smith, Ph.D., Chairperson of the Group

Group Office. 1204 RMI South Building (530) 752-8035; Fax (530) 752-0382; http://www.foodscience.ucdavis.edu

Faculty. Includes members from twelve departments in the Colleges of Agricultural and Environmental Sciences and Engineering, and the Schools of Medicine and Veterinary Medicine.

Graduate Study. The interdepartmental Graduate Group in Food Science offers programs of study leading to the M.S. degree and to the Ph.D. degree. Graduate studies stress the application of the biological, chemical, physical, and behavioral sciences to the processing, preservation, quality evaluation, public health aspects, and utilization of foods. For the M.S. degree, there are four areas of specialization: chemistry-biochemistry, microbiology, engineering-technology and sensory science. Individually designed programs are also acceptable. For the Ph.D., there are four areas of emphasis: biochemistry, chemistry, microbiology/fermentation, and sensory science. Detailed information regarding graduate study is available through the Group Chairperson or the Group office.

Graduate Advisers. Contact the Food Science Graduate Group office at *jlblevins@ucdavis.edu*.

Food Science and Technology

(College of Agricultural and Environmental Sciences)

James N. Seiber, Ph.D., Chairperson of the Department

Department Office. 1206 RMI South Building (530) 752-1465; *http://foodscience.ucdavis.edu*

Faculty

Charles W. Bamforth, Ph.D. D.Sc., Professor
Charlotte Biltekoff, Ph.D., Assistant Professor *(Food Science and Technology, American Studies)*
Stephanie R. Dungan, Ph.D., Professor *(Food Science and Technology, Chemical Engineering and Materials Science)*
J. Bruce German, Ph.D., Professor
Jean-Xavier Guinard, Ph.D., Professor
John M. Krochta, Ph.D., Professor *(Food Science and Technology, Biological and Agricultural Engineering)*
Maria L. Marco, Ph.D., Assistant Professor
Kathryn L. McCarthy, Ph.D., Professor *(Food Science and Technology, Biological and Agricultural Engineering)*
Michael J. McCarthy, Ph.D., Professor *(Food Science and Technology, Biological and Agricultural Engineering)*
Alyson Mitchell, Ph.D., Professor
Nitin N. Nitin, Ph.D., Assistant Professor *(Food Science and Technology, Biological and Agricultural Engineering)*
Michael A. O'Mahony, Ph.D., Professor
Robert Powell, Ph.D., Professor *(Food Science and Technology, Chemical Engineering and Materials Science)*
William L. Ristenpart, Ph.D., Assistant Professor *(Food Science and Technology, Chemical Engineering and Materials Science)*
Moshe Rosenberg, Ph.D., Professor and Specialist in Cooperative Extension
Charles F. Shoemaker, Ph.D., Professor
R. Paul Singh, Ph.D., Professor *(Food Science and Technology, Biological and Agricultural Engineering)*
Carolyn L. Slupsky, Ph.D., Assistant Professor *(Food Science and Technology, Nutrition)*
Gary M. Smith, Ph.D., Professor
Glenn M. Young, Ph.D., Associate Professor

Emeriti Faculty

Everett Bandman, Ph.D., Professor Emeritus
Ericka L. Barrett, Ph.D., Professor Emeritus
John C. Bruhn, Ph.D., Specialist in Cooperative Extension Emeritus
Walter L. Dunkley, Ph.D., Professor Emeritus
Dieter W. Gruenwedel, Ph.D., Professor Emeritus
Norman F. Haard, Ph.D., Professor Emeritus
Jerald M. Henderson, D.Engr., Professor Emeritus
Walter G. Jennings, Ph.D., Professor Emeritus
Michael J. Lewis, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
R. Larry Merson, Ph.D., Professor Emeritus
David M. Ogrydziak, Ph.D., Professor Emeritus
Chester W. Price, Ph.D., Professor Emeritus
David S. Reid, Ph.D., Professor Emeritus
Thomas Richardson, Ph.D., Professor Emeritus
Gerald F. Russell, Ph.D., Senior Lecturer Emeritus
Barbara O. Schneeman, Ph.D., Professor Emeritus *(Food Science and Technology, Internal Medicine, Nutrition)*
Howard G. Schutz, Ph.D., Professor Emeritus
Lloyd M. Smith, Ph.D., Professor Emeritus
Aloys L. Tappel, Ph.D., Professor Emeritus
John R. Whitaker, Ph.D., Professor Emeritus

Major Program and Graduate Study. See the major in Food Science, on page 304; and for graduate study, see Graduate Studies, on page 109.

Related Courses. See courses in Consumer Science, Engineering, Molecular and Cellular Biology, Nutrition, Viticulture and Enology, Environmental Toxicology, Population Health and Reproduction, and Plant Biology.

Courses in Food Science and Technology (FST)

Lower Division Courses

1. Principles of Food Science (3)

Lecture—2 hours; discussion—1 hour. Food science fundamentals. Fresh and processed food technologies; world food problems; food composition; food microbiological and toxicological safety; food laws; evaluation of acceptability and nutritional value. Not open for credit to students who have completed any Food Science and Technology course except course 10.—II. (II.)

3. Introduction to Brewing and Beer (3)

Lecture—3 hours. Basic description of brewing and associated processes, from raw materials to final product; history of brewing and brewing science; types of beer worldwide; world beer markets; basics of beer quality, including wholesomeness; role of scientist in brewing. GE credit: SciEng.—I, II, III. (I, II, III.) Bamforth

10. Food Science, Folklore and Health (3)

Lecture—3 hours. Ancient and modern food folklore in relation to health and well-being. Food safety, organic food, herbalism, food preservation, and nutritional enhancement. Not open for credit to students who have completed course 2. GE credit: SciEng or SocSci.—I, II, III. (I, II, III.) Mitchell, Shoemaker, Smith

47. Food Product Development Field Study (1)

Discussion—6 hours; fieldwork—2 days (course given between winter and spring quarters). Prerequisite: advance enrollment required in winter quarter with instructor; background knowledge in foods from such courses as Food Science and Technology 1. Commercial aspects of the large-scale development, distribution, and evaluation of food products intended for human consumption. (Former course Consumer Science 47.) (P/NP grading only.)—III. (III.)

50. Introduction to Food Preservation (3)

Lecture—3 hours. Prerequisite: Chemistry 2A, Biological Sciences 1A. Introduction to fruit, vegetable, cereal, dairy, seafood and meat commodity groups. Overview of food preservation principles, including heat processing, refrigeration and freezing, dehydration, fermentation, high pressure processing, irradiation and packaging.—III. (III.) Krochta

99. Special Study for Undergraduates (1-5)

(P/NP grading only.)

Upper Division Courses

100A. Food Chemistry (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B; Biological Sciences 1A recommended. Chemical aspects of food composition. Emphasis on the functional properties and chemical reactions of the major components of foods: carbohydrates, lipids, proteins, and water.—I. (I.) Dungan

100B. Food Properties (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A or consent of instructor. Sensory quality, chemical and microbial safety, and nutritional properties of foods. Effects of food processing and preparation on these properties. Selected properties of food commodities.—II. (II.) German

101A. Food Chemistry Laboratory (2)

Lecture/laboratory—4 hours. Prerequisite: course 100A (may be taken concurrently). Chemical aspects of food composition described in course 100A.—I. (I.) Slupsky

101B. Food Properties Laboratory (2)
Lecture/laboratory—1 hour/3 hours. Prerequisite: course 100B (may be taken concurrently). Study of properties of food described in course 100B.—II. (II.) Shoemaker

102A. Malting and Brewing Science (4)
Lecture—4 hours. Prerequisite: Biological Sciences 102, 103; senior standing recommended. The technology of the malting, brewing and fermentation processes is integrated with the chemistry, biochemistry and microbiology that determine industrial practices and product quality. Not open for credit to students who have taken course 102.—II. (II.) Bamforth

102B. Practical Malting and Brewing (4)
Lecture/discussion—2 hours; laboratory—6 hours. Prerequisite: course 102A and analytical experience beyond Chemistry 2C, such as Viticulture and Enology 123, Food Science and Technology 103, 123L, Molecular and Cellular Biology 120L. Open to seniors only in Fermentation Science or Food Science and Technology. Provides practical working knowledge of analytical methods used in malting and brewing and experience with brewing materials and processes, by analysis of samples that illustrate the range of values experienced in practice and pilot scale brewing.—III. (III.) Bamforth

103. Physical and Chemical Methods for Food Analysis (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Chemistry 2C, 8B, Biological Sciences or Animal Biology 102 (may be taken concurrently), courses 100A, 101A (may be taken concurrently). Theory and application of physical and chemical methods for determining the constituents of foods. Modern separation and instrumental analysis techniques are stressed.—II. (II.) Mitchell

104. Food Microbiology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 102. Microorganisms in food safety, spoilage, and production. Food-borne disease agents and their control. Growth parameters of food spoilage agents. Destruction of microbes in food. Food fermentations. The development of microbes as a resource for the food industry.—II. (II.) Marco

104L. Food Microbiology Laboratory (4)
Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, course 104. Cultural and morphological characteristics of microorganisms involved in food spoilage, in food-borne disease, and food fermentation. Analysis of microbiological quality of foods.—III. (III.) Young

107. Food Sensory Science (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Agricultural Management and Rangeland Resources 120 or course 117 (may be taken concurrently). Critical examination of techniques and theories of sensory measurement of food; measures of consumer perception and acceptance. An introduction to the sensory and cognitive systems associated with the perception of food. Not open for credit to students who have completed course 107A.—I. (I.) O'Mahony

108. Food Processing Plant Sanitation (2)
Lecture—2 hours. Prerequisite: Chemistry 8B, Biological Sciences 1A, course 104 (may be taken concurrently) or consent of instructor. Sanitary control of food processing, including water treatment, chemical and physical sanitizing agents; principles of cleaning and hard surface detergency, metal corrosion, pest control, and waste disposal; role of regulatory agencies.

109. Principles of Quality Assurance in Food Processing (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Statistics 13 or Agricultural Management and Rangeland Resources 120. Quality assurance measurement techniques applied to selected food processed products emphasized. Rationale for establishing valid quality assurance programs including selection of samples at critical points. Statistical problems in quality assurance programs used by the food industry.—III. (III.) K. McCarthy

110A. Physical Principles in Food Processing (3)
Lecture—2 hours; laboratory—2 hours. Prerequisite: Physics 5A and 5B or 7A-7B-7C or the equivalent; calculus recommended. Not open for credit to students enrolled in College of Engineering. Applications of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, and problem solving.—I. (I.) M. McCarthy

110B. Heat and Mass Transfer in Food Processing (3)
Lecture—2 hours; laboratory—2 hours. Prerequisite: course 110A or the equivalent; Applied Biological Systems Technology 110L recommended (may be taken concurrently). Rate processes: conduction, convection, and radiation heat transfer; microwave heating, refrigeration, freezing, psychrometrics; mass transfer during drying and storage.—III. (III.) Singh

117. Design and Analysis for Sensory Food Science (3)
Lecture—3 hours. Prerequisite: Statistics 13 or consent of instructor. Methods of design and analysis for sensory food science. Experimental design strategies. Use of taste panels and consumer testing. Data analysis and computation including the relative merits and limitations of parametric and nonparametic approaches. Modifications for quality assurance.—I. (I.) O'Mahony

119. Chemistry and Technology of Milk and Dairy Products (4)
Lecture—4 hours; demonstrations and a field trip. Prerequisite: Biological Sciences 1A and 102, or consent of instructor. Composition, structure and properties of milk and products derived from milk. Relates chemical, microbiological, and technological principles to commercial practices in processing of milk and its products.—III. Rosenberg

120. Principles of Meat Science (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A. Anatomical, physiological, developmental and biochemical aspects of muscle underlying the conversion of muscle to meat. Includes meat processing, preservation, microbiology and public health issues associated with meat products. (Same course as Animal Science 120.) GE credit: SciEng.

120L. Meat Science Laboratory (2)
Discussion—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 1A; course 120 (may be taken concurrently). Laboratory exercises and student participation in transformation of live animal to carcass and meat, structural and biochemical changes related to meat quality, chemical and sensory evaluation of meat, and field trips to packing plant and processing plants. (Same course as Animal Science 120L.)

123. Introduction to Enzymology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 103. Principles of physical, chemical and catalytic properties of enzymes and their importance. Purification, characterization, and quantitative evaluation of reaction conditions on activity are stressed. Specificity and mechanism of action illustrated by use of selected enzymes. (Former course Biochemistry and Biophysics 123.)—III. (III.) G. Smith

123L. Enzymology Laboratory (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: Biological Sciences 103, course 123 (concurrently). Laboratory procedures involved in detection, purification and characterization of enzymes. (Former course Biochemistry and Biophysics 123L.)—III. (III.) G. Smith

127. Sensory Evaluation of Foods (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Agricultural Management and Rangeland Resources 120 or course 117. A critical examination of methods of sensory measurement applied to food and beverage systems; descriptive analysis and consumer tests and their application to quality assurance, product development and optimization.—II. (II.) Guinard

128. Food Toxicology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102, 103. Chemistry and biochemistry of toxins occurring in foods, including plant and animal toxins, intentional and unintentional food additives. The assessment of food safety and toxic hazards. (Same course as Environmental Toxicology 128.) GE credit: SciEng.—III. (III.) Mitchell, Shibamoto

131. Food Packaging (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B, Biological Sciences 1A, Physics 7C. Principles of food packaging. Functions of packaging. Properties of metal, glass, paper and plastic materials and packages. Design, fabrication, and applications of food packaging. Packaging of fresh and processed foods, including fruits and vegetables, dairy foods, beer and wine.

151. Food Freezing (1)
Discussion—1 hour; online lecture. Prerequisite: course 110A or the equivalent. Mechanisms of ice crystallization, interpretation of freezing diagrams, and modes of heat transfer. Food properties at subfreezing temperatures, refrigeration requirements, and estimation of freezing times. Industrial systems used in freezing foods.—III. (III.) Singh

159. New Food Product Ideas (2)
Lecture/discussion—2 hours. Prerequisite: upper division standing with background course work in food science (course 50 or 100A), biological sciences (Biological Sciences 1A, 1B, 1C), or the physical sciences (Physics 5A, 5B, 5C or Chemistry 2A, 2B, 2C). Course will familiarize students with initial stages of food product development, including definition and articulation of a problem, generation of ideas to solve the problem, screening of ideas, and the formal presentation of a new product concept.

160. Food Product Development (4)
Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: upper division standing with background course work in food science (course 50 or 100A), biological sciences (Biological Sciences 1A, 1B, 1C), or the physical sciences (Physics 5A, 5B, 5C or Chemistry 2A, 2B, 2C). Product implementation stage of food product development including preliminary product description, prototype development, product testing, and formal presentation of a new product development.—II. (II.)

190. Senior Seminar (1)
Seminar—1 hour. Prerequisite: senior standing or consent of instructor. Selected topics presented by students on recent advances in food science and technology. Reports and discussions concerning oral and written presentations, literature sources and career opportunities.—II, III. (II, III.) Shoemaker, Seiber

192. Internship for Advanced Undergraduates (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in the practical application of food science. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

201. Food Chemistry and Biochemistry (4)
Lecture—4 hours. Prerequisite: undergraduate courses in organic chemistry and biochemistry; undergraduate course in food chemistry is recommended. Advanced topics in food chemistry and biochemistry, emphasizing the application of the basic principles of chemistry and biochemistry to food composition, properties, preservation and processing. Chemical structures, interactions, reaction mechanisms and experimental methods are stressed.—I. (I.) G. Smith, Shoemaker

202. Chemical and Physical Changes in Food (4)
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 103; Chemistry 107B. Fundamental principles of chemistry and physics are applied to a study of changes in water binding properties and activity, changes in proteins, nutrients, toxic constituents, and other compounds during storage, heating, freezing, dehydrating, and concentrating of food materials.—III. (III.) Dungan

203. Food Processing (3)
Lecture—3 hours. Prerequisite: course 110A, Physics 5C or 7C, Chemistry 107B, and one undergraduate food processing course. Principles of food engineering applied to food processing. Relationship of Newtonian and non-Newtonian fluid properties to heat and momentum transfer. Application of mass transfer in controlling kinetics and quality changes of foods.—II. (II.) K. McCarthy, M. McCarthy

204. Advanced Food Microbiology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1C, 103, course 104 or a course in microbiology. Principles of and recent developments in food microbiology, including food pathogen virulence and detection, parameters of microbial growth in food, and the microbiology of food and beverage fermentations.—III. (III.) Marco, Young

205. Industrial Microbiology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 102, 103; Microbiology 130A-130B or Biological Sciences 101 recommended. Use of microorganisms for producing substances such as amino acids, peptides, enzymes, antibiotics and organic acids. Emphasis on metabolic regulation of pathways leading to fermentation products, on yeast fermentations, and on genetic manipulations (including recombinant DNA techniques) of industrial microorganisms. Offered in alternate years.

207. Advanced Sensory-Instrumental Analyses (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 107 and consent of instructor. Basic principles of measurement of color, texture, and flavor of foods by sensory and instrumental methods. Advanced statistical analysis of relation of colorimetry, texturometry, and chemistry of volatile compounds to perception of appearance, texture, flavor. Offered in alternate years.

210. Proteins: Functional Activities and Interactions (3)
Lecture—3 hours. Prerequisite: Biological Sciences 103. The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products.

211. Lipids: Chemistry and Nutrition (3)
Lecture—3 hours. Prerequisite: Biological Sciences 103, Chemistry 107B, 128B. Chemistry of lipids as it pertains to research in food and nutrition. Relations between lipid structure and their physical properties in tissues and foods. Regulation of absorption, transport, and metabolism of lipids. Implications of dietary fats and health.—II. (II.) German

213. Flavor Chemistry of Foods and Beverages (3)
Lecture/discussion—3 hours. Prerequisite: Chemistry 8B, Viticulture and Enology 123, Viticulture and Enology 123L or course 103 or consent of instructors. Students will become familiar with basic principles of flavor chemistry, analysis, and formation in fresh and processed foods. Students will be required to read and critically evaluate flavor chemistry literature. (Same course as Viticulture and Enology 213).—III. (III.) Ebeler, Heymann

217. Advanced Food Sensory Science (3)
Lecture—3 hours. Prerequisite: course 107 (may be taken concurrently) or consent of instructor. Advanced study of the techniques and theory of the sensory measurement of food as an analytical tool and as a measure of consumer perception and acceptance. Advanced examination of the sensory and cognitive systems associated with the perception of food.—I. (I.) O'Mahony

219. Biochemistry, Microbiology and Technology of Cheeses of the World (4)
Lecture—4 hours. Prerequisite: course 119 and Biological Sciences 103 or course 100A, 123, Biological Sciences 103, Chemistry 107B, 128B or consent of instructor. Restricted to graduate level students or senior undergraduate students with appropriate background in biochemistry and microbiology. Compositional and physico-chemical aspects of milk and their implications on cheesemaking; enzymatic, microbiological and physical aspects of cheesemaking; cheese as a biological composite; designing cheese quality attributes; cheese aging. Cheese from all over the world will be tasted and discussed. Offered in alternate years.—(III.) Rosenberg

227. Food Perception and the Chemical Senses (2)
Lecture—2 hours. Prerequisite: course 107B (may be taken concurrently), or consent of instructor. Examination of the anatomy and physiology of the chemical senses (taste, smell, and the trigeminal senses) and how they are involved in the perception of food and food intake.—II. Guinard

290. Seminar (1)
Seminar—1 hour. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Advanced Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Critical presentation and evaluation of original research by graduate students. Planning of research programs and proposals. Discussion led by individual major instructors for their research group. (S/U grading only.)—I, II, III. (I, II, III.)

291. Advanced Food Science Seminar (1)
Seminar—1 hour. Prerequisite: completion of at least one quarter of course 290. Oral presentation of student's original research, discussion, and critical evaluation. (S/U grading only.)—III. (III.)

298. Group Study (1-5)

299. Research (1-12)
Prerequisite: graduate standing. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Food Service Management

(College of Agricultural and Environmental Sciences)

Faculty. See under the Department of Nutrition, on page 440.

The Major Program and Graduate Study. Food Service Management is incorporated within the major of Clinical Nutrition. If you are interested in preparing for a career in commercial organizations such as hotels, restaurants, industrial cafeterias, or contract food services, as well as in public or private institutions such as hospitals, correctional institutions, schools, or colleges, consult the Department of Nutrition.

Related Courses. See Nutrition.

Courses in Food Service Management (FSM)

Questions pertaining to the following courses should be directed to the instructor or to the Nutrition Department Advising office in 3211 Meyer Hall (530) 752-2512.

Upper Division Courses

120. Principles of Quantity Food Production (4)
Lecture—3 hours; independent study—1 hour. Prerequisite: Food Science and Technology 100B and 101B. Restricted to upper division Clinical Nutrition students only. Fundamental principles of food service management, including quantity food preparation, institutional equipment, receiving and storage, service, menu planning, merchandising, and safety. Students will earn food safety certification.—III. (III.) Hudson

120L. Quantity Food Production Laboratory (2)
Laboratory—6 hours. Prerequisite: course 120. Laboratory experience in quantity food production and service.—I. (I.) Hudson

122. Food Service Systems Management (3)
Lecture—3 hours. Prerequisite: Agricultural and Resource Economics 112, courses 120, 120L, 121. Principles of quantity food production management: production schedules, portion control, financial management, layout and equipment planning, evaluation of alternative systems, and computer applications.—II. (II.) Hudson

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: one upper division course in Food Service Management and consent of instructor. Work experience on or off campus in practical aspects of food service management, supervised by a faculty member. (P/NP grading only.)—Steinberg

197T. Tutoring in Food Service Management (1-2)
Discussion/laboratory—3 or 6 hours. Prerequisite: Dietetics or related major; completion of the Food Service Management course in which tutoring is done. Tutoring of students in food service management, assistance with discussion groups or laboratory sections; weekly conference with instructor in charge of course; written evaluations. May be repeated if tutoring a different course. (P/NP grading only.)—Steinberg

198. Directed Group Study (1-5)
(P/NP grading only.)—Steinberg

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)—Steinberg

Forensic Science (A Graduate Group)

Robert H. Rice, Ph.D., Chairperson of the Group

Group Office. 1632 Da Vinci Ct., Room 90, Davis, CA 95618 (530-757-8699); *http://forensicscience.ucdavis.edu*

Faculty

Faculty members are listed on the website.

Graduate Study. The Forensic Science Graduate Group offers the degree of MS in Forensic Science. This program, offering a Plan I-Thesis or a Plan II-Capstone Project option, has two tracks, DNA or Criminalistics, enabling the student to take core courses emphasizing the physical or biological sciences. Each track requires the student to take six core courses, totaling 18 units, three units of seminar, and the appropriate number of elective/research units, depending on the selection of Plan I or Plan II, for a total of 48 units. Students can take courses outside their specializations, but they must complete the courses required for their own track. The FOR seminar course in the fall quarter is required for new students. The FOR spring seminar can be taken in any spring quarter before graduation. Students must also take one additional Seminar course in another department.

Preparation. Appropriate preparation is an undergraduate degree in physical or natural sciences, engineering or a closely related field with a GPA of 3.000 or higher. Examples include Biochemistry, Chemistry, Molecular Biology, Biology, Genetics, and Engineering. Applicants must have completed at least one year each of general chemistry, organic chemistry, general physics and math through calculus. Other recommended courses include general biology, biochemistry, genetics and statistics.

Graduate Advisors. Ralph Aldredge *(Mechanical and Aerospace Engineering)*, Christyann Darwent *(Anthropology)*, Paul Gepts *(Plant Sciences)*, David Howitt *(Chemical Engineering and Material Science)*, Ed Imwinkelried *(School of Law)*, Don Land (Chemistry), Leslie Lyons *(Population Health & Reproduction)*, Moshe Rosenberg *(Food Science and Technology)*

Courses in Forensic Science (FOR)

Graduate Courses

200. Fundamental Concepts in Forensic Science (3)
Lecture—2 hours; fieldwork—0.25 hours; lecture/laboratory—0.25 hours; seminar—0.5 hours. Overview of forensic science. Problem definition, strategies for problem solving, analytical tools, and professional and ethical considerations.—II. (II.) Sensabaugh

205. Microscopy and Microanalytical Methods in Forensic Science (3)
Lecture—2 hours; seminar—1 hours. Prerequisite: consent of instructor. Introduction to optical and electron microscopy. Transmission, diffraction, reflection and absorption; polarized light and polarizing crystals; phase contrast. radiography; image recording, SEM analysis of gunshot residues, paints, glass. EDS, XRF analysis, signal-to-noise ratios, minimum detectable levels and homogeneity. Restricted to students enrolled in the M.S. in Forensic Science Program. As a minimum, year each of the following chemistry, organic chemistry, calculus, & physics. Offered in alternate years.—III. Howitt

210. Personal Identification Methods in Forensic Science (3)
Lecture—3 hours. Prerequisite: restricted to students enrolled in the M.S. Forensic Science Program or consent of instructor. Methods for identifying individuals from evidence collected at crime scenes, suspects or victims, crime scene examination and analytical methods used to support such investigations. Topics include forensic anthropology and odontology; latent prints; shoe prints; facial reconstruction/recognition; eyewitness identifications; biometric systems. Offered in alternate years.—II. (II.) Thornton

212. Scientific Evidence and Courtroom Testimony (3)
Lecture—2 hours; discussion—1 hours. Prerequisite: graduate students enrolled in the MS Forensic Science program or by consent of instructor. Explores the relationship between science and the criminal justice system. Admissibility of scientific testimony and documentary proof during the trial, concepts of relevancy, hearsay and opinion rule, examination of expert witnesses, impact of Kelley-Fry and Daubert decisions & court testimony.—III. (III.) Harmon, Maucieri

215. Forensic Fire and Arson Investigation (3)
Lecture—3 hours. Prerequisite: open only to students enrolled in the M.S. Forensic Science program or by consent of the Forensic Science Program Director. Principles and techniques of scientific investigation of fires and related crimes; offer peer-reviewed protocols for processing fire and explosion scenes; discuss recognition, collection, analysis of physical evidence, and describe the scientific method for decision-making in fire/arson investigation. Offered in alternate years—(III.) DeHaan

220. Analysis of Toxicants (3)
Lecture—3 hours. Prerequisite: coursework in organic chemistry. Principles of microanalysis of toxicants. Theoretical considerations regarding separation, detection and quantitative determination of toxicants using chemical and instrumental techniques. (Same course as Environmental Toxicology 220.)—I. (I.) Seiber, Wood

221L. Forensic Science Analytical Instrumentation (2)
Lecture/discussion—1 hour; laboratory—3 hours. Methodology and instruments used for the analysis of substances of interest in the discipline of Forensic Science. Practical experience with modern instrumental techniques & methodologies used in the advanced forensic science laboratory. Limited to students accepted in the Forensic Science Graduate program or subject to the approval of the instructor if the student has the appropriate chemistry, calculus and physics courses required of students in the graduate forensic science program. Offered in alternate years.—I. (I.) Land

240. Homicide Crime Scene Investigation (3)
Lecture—2 hours; laboratory—3 hours. Processing and evaluating complex homicide scenes. Functions and activities of police agencies. Recognition, documentation, identification, and collection of evidence. Event sequence reconstruction. Evidence collection, preservation, report writing. Courtroom presentation.—I. (I.) Springer

268. Statistics in Forensic Science (3)
Lecture—3 hours. Prerequisite: consent of instructor. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of Forensic Science Program Director. Statistics that are used by the forensic scientist, their limitations/applications in presenting evidential results in such areas as DNA-STR results, trace evidence correlation, fingerprint statistics, population sampling and the Bayes method. Offered in alternate years.—II. Land

278. Molecular Techniques (3)
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Recombinant DNA technology and its applications. (Same course as Environmental Toxicology 278.) Offered in alternate years.—(I.) Denison, Rice

280. Forensic DNA Analysis (3)
Lecture—3 hours. Prerequisite: coursework in genetics and molecular biology. Foundation in theory and practice of forensic DNA analysis; past, present, and emerging technologies; legal and quality assurance issues. DNA extraction, DNA quantitation, multiplex amplification of STR loci, capillary electrophoresis of amplified products, and analysis of STR typing data. (Same course as Environmental Toxicology 280.)—II. (II.) Von Beroldingen

281. Principles and Practice of Forensic DNA Typing (2)
Lecture—1 hour; laboratory/discussion—3 hours. Prerequisite: consent of instructor; course 278 or 280, or equivalent. Restricted to students enrolled in the M.S. in Forensic Science Program or by consent of Forensic Science Program Director. Overview of the principles underlying forensic DNA typing. Application in the laboratory using techniques to extract, quantify and type human DNA as found in forensic samples.—III. (III.) Ballard

283. Forensic Biology (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: consent of instructor. Restricted to students enrolled in the M.S. in Forensic Science program or by consent of the Forensic Science Program Director. Overview of the foundational concepts in forensic biology: chemistry and molecular biology of biological evidence, genetic basis of biological uniqueness, evolutionary basis of species differences, patterns and dynamics of evidence deterioration, and the legal/ professional considerations associated with biological evidence.—II. (II.) Sensabaugh

289. Survey in Forensic Science (3)
Lecture—3 hours. Analytical methods in contemporary forensic science. Clandestine laboratories in California, crime scene management, examination and analysis of human hair, forensic ballistics/trajectory reconstruction, shoe/tire print impressions, serial number restoration, forensic aspects of alcohol impairment, bloodstain pattern interpretation, microscopy of building materials, biological aspect of forensic science. May be repeated for credit when topic differs.—I, II, III. Howitt

290. Seminar in Forensic Science (1)
Seminar—3 hours. Students will be exposed to topical areas in Forensic Science by presentations conducted by expert guest speakers. The seminar will also serve as a medium whereby the exiting students will present the research conducted as part of their thesis requirement. May be repeated for credit when topic differs. Restricted to students enrolled in the M.S. in Forensic Science Program. (S/U grading only.)—I, III. (I, III.)

290C. Graduate Research Conference in Forensic Science (1)
Independent study—1 hour. Individual and/or group conference on problems, progress and techniques in forensic science and research. May be repeated for credit when topic differs. (S/U grading only.)—I, II, III.

293. Forensic Science Research Methodology (2)
Lecture—1.5 hour; extensive writing or discussion—0.5 hours. Prerequisite: graduate students enrolled in the MS Forensic Science program or by consent of instructor. Introduction to identification, formulation, and solution of meaningful scientific problems encountered in the Forensic Science area including experimental design and/or theoretical analysis of new and prevailing techniques, theories and hypotheses. Students will present and defend their thesis research/journal article proposals. Limited enrollment. Offered in alternate years. (S/U grading only.)—III. (III.)

298. Group Study in Forensic Science (1-5)
(S/U grading only.)

299. Research in Forensic Science (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

French

(College of Letters and Science)

Julia Simon, Ph.D., Chairperson of the Department

Department Office. 213 Sproul Hall
(530) 752-1219; *http://french.ucdavis.edu*

Faculty

Nicole Asquith, Ph.D., Assistant Professor
Jeff Fort, Ph.D., Assistant Professor
Noah Guynn, Ph.D., Associate Professor
Guillaume J. Peureux, Ph.D., Associate Professor
Eric Russell Webb, Ph.D., Assistant Professor
Julia Simon, Ph.D., Professor

Emeriti Faculty

Claude Abraham, Ph.D., Professor Emeritus
Edward M. Bloomberg, Ph.D., Professor Emeritus
Ruby Cohn, Ph.D., Professor Emerita
Gerald Herman, Ph.D., Senior Lecturer Emeritus
Margo R. Kaufman, M.A., Senior Lecturer Emerita
Manfred Kusch, Ph.D., Senior Lecturer Emeritus
(French, Comparative Literature)
Marshall Lindsay, Ph.D., Professor Emeritus
Maria I. Manoliu, Ph.D., Professor Emerita
Michèle Praeger, Ph.D., Professor Emerita
Leslie Rabine, Ph.D., Professor Emerita
(Women and Gender Studies, French)
Ruth B. York, Ph.D., Senior Lecturer Emerita

The Major Program

The major program assures proficiency in all four of the language skills—speaking, understanding, reading, and writing—and acquaints students with the intellectual and cultural contributions of the French-speaking world through the study of its literature, traditions, and institutions.

The Program. The department encourages its students to work closely with the academic adviser in designing a major tailored to their needs and interests within the broad requirements prescribed by the program and to avail themselves of the guidance of an excellent teaching faculty. The department sponsors an active French Club and a chapter of Pi Delta Phi, the National French Honor Society. Each year, a substantial number of students with good preparation in French participate in the university's very popular Education Abroad Program, which maintains centers at seven French universities.

Career Alternatives. Foreign language teachers, a cardiologist, a veterinarian, a naval commander at the Pentagon, a professor of Political Science, lawyers, sales representatives, journalists, an anesthesiologist, a law professor, translators, a senior applications programmer, travel agents, independent business owners, a senior museum preparator, nurses, financial managers, stock brokers, and an industrial attaché for a French Trade Commission, all graduated with an A.B. in French from UC Davis and represent only a small fraction of the career choices documented in a recent survey of department graduates.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter..... 4-34

French 1, 2, 3 (or the equivalent)..... 0-15
French 21, 22, 23 0-15
Linguistics 1 or 4..... 4

Depth Subject Matter 44

French 100 4
Three French literature courses from among the following (at least one course must cover pre-revolutionary literature; such courses are marked with an asterisk): 101, 102, 103, *115, *116, *117A, *117B, *118A, *118B, 119A, 119B, 119C, 120, 121, 124, 125, 130, 140, 141..... 12
Two French culture courses from among the following: 107, 108, 127, 128..... 8
Two French linguistics and language science courses from among the following: 105, 109, 160, 161, 162..... 8
Elective courses in French literature, language, or culture, to be chosen in consultation with an undergraduate adviser from among the following: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 115, 116, 117A, 117B, 118A, 118B, 119A, 119B, 119C, 120, 121, 124, 125, 127, 128, 130, 133, 140, 141, 160, 161, 162..... 12

Total Units for the Major 48-78

Recommended

French 107, 108, 109, 160 and 161 in addition to other upper division courses, for a total of 45 units for students interested in obtaining a "single subject" teaching credential in California.

Major Adviser. J. Fort

Minor Program Requirements:

UNITS

French 24

French 100 4
One French literature course from among the following: 101, 102, 103, 115, 116, 117A, 117B, 118A, 118B, 119A, 119B, 119C, 120, 121, 124, 125, 130, 140, 141..... 4
One French culture course from among the following: 107, 108, 127, 128..... 4
One French linguistics and language science course from among the following: 105, 109, 160, 161, 162 4
Two elective courses in French literature, language, or culture from among the following: 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 115, 116, 117A, 117B, 118A, 118B, 119A, 119B, 119C, 120, 121, 124, 125, 127, 128, 130, 133, 140, 141, 160, 161, 162 8

Honors Program. Candidates for high or highest honors in French must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in French 194H (3 units) and French 195H (3 units). Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chair. Only students who, at the end of the junior year (135 units), have attained a cumulative grade-point average of 3.500 in courses required for the major will be eligible for the honors program. The requirements for earning high and highest honors in French are in addition to the regular requirements for the major in French.

Teaching Credential Subject Representative. See the Teaching Credential/M.A. Program on page 114.

Graduate Study. The Department offers programs of study and research leading to the Ph.D. degree in French. Candidates for the Ph.D. have the option of enriching their degree program by preparing a designated emphasis in African American and African Studies, Critical Theory, Feminist Theory and Research, Classics and Classical Reception, Second Language Acquisition, or Studies in Performance and Practice. Detailed information may be obtained from the graduate adviser or the department chairperson.

Graduate Advisers. G. J. Peureux

Prerequisite Credit. Credit will not normally be given for a course if it is the prerequisite of a course already successfully completed. Exceptions can be made by the department chairperson only.

Courses in French (FRE)

Students offering high school language preparation as a prerequisite must take a placement test.

Course Placement. Students with two years of high school French normally take French 2, those with three years take French 3 and those with four years take French 21.

Lower Division Courses

1. Elementary French (5)
Discussion—5 hours; laboratory—1 hour. Students who have successfully completed French 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.—I, II, III. (I, II, III.)

1A. Accelerated Intensive Elementary French (15)
Lecture/discussion—15 hours. Prerequisite: placement exam required. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to French grammar and development of all language skills in a cultural context with emphasis on communicative ability. Not open for credit to students who have completed courses 1, 2, or 3.—IV. (IV.) Anderson

2. Elementary French (5)
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1.—I, II, III. (I, II, III.)

3. Elementary French (5)
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of course 2.—I, II, III. (I, II, III.)

21. Intermediate French (5)
Lecture/discussion—5 hours. Prerequisite: course 3. Grammar, oral practice, composition. Initiation to French institutions; reading and discussion of short literary texts.—I, II, III. (I, II, III.)

22. Intermediate French (5)
Lecture/discussion—5 hours. Prerequisite: course 21. Continuation of course 21. Grammar, oral practice, composition. Contemporary French culture; reading and discussion of a play.—I, II, III. (I, II, III.)

23. Intermediate French (5)
Lecture/discussion—5 hours. Prerequisite: course 22. Continuation of course 22. Grammar, oral practice, composition. Current topics in French politics and culture; reading and discussion of a novel.—I, II, III. (I, II, III.)

50. French Film (4)
Lecture—1 hour; discussion—2 hours; term paper. Introduction to the tradition of French cinema from its invention by Méliès and the Lumière brothers through New Wave (especially the works of Truffaut and Godard) and more recent developments in French and Francophone film. Taught in English. Offered in alternate years. GE credit: ArtHum, Wrt.—(I, II, III.)

51. Major Works of French Literature in Translation (4)
Lecture—2 hours; discussion—1 hour; term paper. Readings in English translation of key works of French and Francophone literature from the Middle Ages to the present. Particular attention is given to the long-standing interest of French writers in issues of social, regional, gender, sexual, and ethnic identity. GE credit: ArtHum, Div, Wrt.—II. (II.) Fort, Guynn

52. France and the French-Speaking World (4)
Lecture—2 hours; discussion—1 hour; term paper. Taught in English. A survey of the history and culture of France and the French-speaking world, especially Canada, the Caribbean and Africa. Study of social, historical and cultural issues that occupy the French-speaking world, with particular attention to mass media. GE credit: ArtHum, Div, Wrt.—III. (III.)

53. French as a World Language (4)
Lecture/discussion—3 hours; term paper. The linguistic status of French and its function in multilingual societies and international arenas. Linguistico-political landscape of communities in Euroasia, Africa, and the Americas. Sociolinguistic concepts and emergence of French as a world language. Offered in alternate years. GE credit: Div, SocSci, Wrt.—(II.) Russell Webb

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Composition in French (4)
Lecture—3 hours; term paper. Prerequisite: course 23. Instruction and practice in expository writing in French, with emphasis on organization, correct syntax, and vocabulary building.—I, II, III. (I, II, III.) Asquith

101. Introduction to French Poetry (4)
Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing the main types of French poetry. Study of French poetic conventions and versification. GE credit: ArtHum.—II. (I.) Asquith

102. Introduction to French Drama (4)
Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of plays representing the main types of French drama, with emphasis on dramatic structure and techniques. GE credit: ArtHum.—I. (II.) Guynn

103. Introduction to French Prose (4)
Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Analysis and evaluation of works representing main types of French prose, with emphasis on narrative structure and techniques. GE credit: ArtHum.—III. (III.) Simon

104. Translation (4)
Lecture—3 hours; extensive writing. Prerequisite: course 100 or the equivalent. Practice in English-to-French and French-to-English translation using a variety of non-literary materials, illustrating different problems and styles.—III. (III.) Russell Webb

105. Advanced French Grammar (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 23 or the equivalent. Understanding of, and extensive practice with, various grammatical structures in French. Lexical-semantic, morphological, and syntactic analysis.—II. (II.) Russell Webb

106. French in Business and the Professions (4)
Lecture—1 hour; discussion—2 hours; frequent written assignments. Prerequisite: course 100 or consent of instructor. The French language as used in the commercial sphere. Emphasis on proper style and form in letter-writing, and in non-literary composition. Technical terminology in such diverse fields as government and world business.—I. (I.)

107. The Making of Modern France (4)
Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Introduction to French culture through a historical approach to topics such as the citizen and the state (politics, justice, social security), the nation and centralization, the rise of public education, colonization, class and social relationships. Offered in alternate years. GE credit: ArtHum.—(I.) Simon

108. Modern French Culture (4)
Lecture—3 hours; extensive writing. Prerequisite: course 100 or consent of instructor. Survey of modern French culture from the Dreyfus affair to the present day. Topics mayex include women and French culture, decolonialization and modernization, education, social welfare and immigration.—Peureux, Simon

109. French Phonetics (4)
Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: course 23 or the equivalent. Introduction to the sound-inventory of French and practice in phonetic transcription, with a focus on ways in which phonetic contrasts signal grammatical contrasts; spoken forms and spelling; formal differences between the 'Standard' and other varieties across the French-speaking world. Offered in alternate years.—III. Russell Webb

110. Stylistics and Creative Composition (4)
Lecture—3 hours; frequent papers. Prerequisite: course 100 or consent of instructor. Intensive course in creative composition using a variety of techniques and literary styles, patterned on Queneau's Exercices de style. Practice in such stylistic modifications as inversion, antithesis, changes in tense, mood, tonality, etc. The writing of poetry.—II. (II.) Russell Webb

115. Medieval French Literature and Society (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 100. Social and cultural life of medieval France as studied through its representation in such literary works as La Chanson de Roland, courtly love lyric, the Arthurian romances of Chrétien de Troyes, Aucassin et Nicolette, selected fabliaux and farces. Offered in alternate years. GE credit: ArtHum.—I. Guynn

116. The French Renaissance (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 100. Overview of major works and writers with particular attention to the historical context of the turbulent 16th century. Writers to be read may include Rabelais, Marot, Ronsard, Du Bellay, Labé, Marguerite de Navarre, Montaigne, and D'Aubigné. Offered in alternate years. GE credit: ArtHum.—(III.) Peureux

117A. Baroque and Preclassicism (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. The literature and intellectual culture of the period between the Renaissance and French classicism. Offered in alternate years. GE credit: ArtHum.—(II.) Peureux

117B. The Classical Moment (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Literature, culture, and politics in the "Age of Louis XIV." May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum.—(III.) Guynn, Peureux

118A. The Age of Reason and Revolution (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Literature and philosophy of the French Enlightenment. Readings from such authors as Bayle, Fontenelle, Montesquieu, Voltaire, Rousseau and Diderot. Offered in alternate years. GE credit: ArtHum.—(II.) Simon

118B. Private Lives and Public Secrets: The Early French Novel (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 103. History of the French roman from the Middle Ages to the Revolution with particular emphasis on the novels of the 18th century. Offered in alternate years. GE credit: ArtHum.—II. Simon

119A. The Romantic Imaginary (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Major concepts and themes of French Romanticism, such as dream and the supernatural, impossible love, exoticism, revolution, individualism, nature, the mal du siècle, Romantic irony, the creative imagination, the cult of ruin. Offered in alternate years. GE credit: ArtHum.—II.

119B. Realism, History and the Novel (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Investigation of the narrative and historical codes of French realist fiction, with emphasis on the representation of history in the realist novel, its depiction of social "realities" such as class and gender, and its relation to the historical situation of post-revolutionary society. Offered in alternate years. GE credit: ArtHum.—(III.)

119C. From Baudelaire to Surrealism (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101. Study of the main poets and poetic movements from the mid-19th to the early 20th century, including Baudelaire, the Symbolists, and the Surrealists. Offered in alternate years. GE credit: ArtHum.—(I.) Asquith

120. Modern French Thought (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Overview of post-Second World War French intellectual currents from existentialism to structuralism and deconstructionism. Readings will include Sartre and de Beauvoir, Camus, Lévi-Strauss, Lacan, Barthes, Foucault, Derrida, Kristeva, Sollers, Cixous, and Irigaray. Offered in alternate years. GE credit: ArtHum.—(I.) Fort

121. Twentieth Century French Novel (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 103. Novels and theories of the novel, from Proust to the Nouveau Roman and beyond. Readings from among Gide, Sartre, de Beauvoir, Camus, Breton, Beckett, Robbe-Grillet, Sarraute, Simon, Barthes, Duras, Tournier, Perec, Modiano, Guibert, Toussaint. Offered in alternate years. GE credit: ArtHum.—(II.) Fort

122. French and Francophone Film (4)
Lecture/discussion—4 hours; extensive writing; fieldwork—3 hours. Prerequisite: course 100 or consent of instructor. French and Francophone film from the Lumière Brothers to the present. Topics may include analysis of film form and narrative, major filmmakers and filmic traditions, and film theory. May be repeated one time for credit. Offered in alternate years. GE credit: ArtHum.—(I.) Fort

124. Post-Colonialist and Francophone Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Introduction to Post-Independence Black African and/or Caribbean and/or North African literatures written in French. Selected topics include: identity and subjectivity, the role of the intellectual, women's voices, languages and oral literatures, cultural syncretism, theories of post-colonialism. May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum, Div.—(III.) Adejunmobi

125. French Literature and Other Arts (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. The relationship between French literature and other arts—painting, music, cinema, architecture, opera—from different periods. May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum.—II. Guynn

127. Paris: Modernity and Metropolitan Culture (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Study of the representation of Paris in 19th and 20th century texts and its importance in defining the experience and art of modernity. Offered in alternate years. GE credit: ArtHum.—(III.) Simon

128. Topics in French Culture (4)
Lecture—3 hours; extensive writing. Prerequisite: course 100 or consent of instructor. In-depth study of a particular topic in French culture. Topics may include the Court of Louis XIV, the French Revolution and Immigration. May be repeated one time for credit when topic differs. Offered in alternate years.—Guynn, Simon

130. From Page to Stage: Theatre and Theatricality (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 102. French theater as literature and performance. May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum.—I. Guynn, Peureux

133. Gender and Politics in French Literature and Culture (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101, 102, or 103. Examination of the thematic, theoretical and political tendencies in contemporary French fiction. Barthes, Foucault, Duras, Guibert, considered in terms of their writing on identity and gender. Offered in alternate years. GE credit: ArtHum, Div.—I.

140. Study of a Major Writer (4)
Lecture—3 hours; term paper. Prerequisite: course 100 and course 101, 102, or 103 as appropriate to selected topic, or consent of instructor. Concentrated study of works of a single author. May be repeated one time for credit as author-subject changes.—II. (II.)

141. Selected Topics in French Literature (4)
Lecture—3 hours; term paper or short papers. Prerequisite: courses 100 and 101 or 102 or 103 as appropriate to the selected topic or consent of instructor. Subjects and themes such as satiric and didactic poetry of the Middle Ages, poetry of the Pléiade, theater in the eighteenth century, pre-romantic poetry, etc. May be repeated two times for credit when topic differs.—II. (II.)

160. Linguistic Study of French-Sound and Form (4)
Seminar—3 hours; term paper. Prerequisite: course 109 and Linguistics 1, or consent of instructor. Introduction to the linguistic study of modern French, with focus on sound structure and form, inflection and derivation.—II. (II.) Russell Webb

161. Linguistic Study of French—Form and Meaning (4)
Seminar—3 hours; term paper. Prerequisite: one of course 104, 105, 160, 162 and Linguistics 1, or permission of instructor. Introduction to the linguistic study of modern French, with focus on sentence construction and constituency, meaning and discourse functions.—III. (III.) Russell Webb

162. History of French Language (4)
Lecture—3 hours; term paper. Prerequisite: course 160. Main periods in development of the French language, from Latin to contemporary popular aspects, with emphasis on relationship between socio-cultural patterns and evolution of the language. GE credit: ArtHum.—II. (II.) Russell Webb

192. Internship (1-12)
Internship—3-36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Practical application of the French language through work experience in government and/or business, culminating in an analytical term paper on a topic approved by the sponsoring instructor. (P/NP grading only.)

194H. Special Study for Honors Students (4)
Independent study—4 hours. Prerequisite: open only to French majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in French literature, civilization, or language studies. (P/NP grading only.)

195H. Honors Thesis (4)
Independent study—4 hours. Prerequisite: course 194H. Writing of an honors thesis on a topic in French literature, civilization, or language studies under the direction of a faculty member. (P/NP grading only.)—I, II, III. (I, II, III.)

197T. Tutoring in French (1-4)
Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing and consent of Chairperson. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

197TC. Tutoring in the Community (2-4)
Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing and consent of Chairperson. Tutoring in public schools under the guidance of a regular teacher and supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

200. Introduction to Graduate Study in French (2)
Seminar—2 hours. Prerequisite: graduate standing. An introduction to a range of methodologies and critical practices in the field of French Studies, including literature, culture, and linguistics. The course will cover basic principles of bibliographic research in the humanities. (S/U grading only.)—I. (I.)

201. History of French (4)
Seminar—3 hours; term paper. Presentation of the main changes in the grammatical structures of French, from Latin to contemporary usage, involving textual analysis and sociolinguistic description.—I. (I.) Guynn, Russell Webb

202. Topics in French Civilization (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Interdisciplinary approach to the study of French and Francophone civilization from the Middle Ages to the present. Course content will vary by instructor. May be repeated for credit.—I. (I.) Simon

204. Topics in Medieval Literature (4)
Seminar—3 hours; term paper. Study of Medieval French literature, focusing on a particular period, milieu, literary movement, genre, or theoretical approach. May be repeated for credit when topic differs.—I. (I.) Guynn

205A. Sixteenth-Century Literature: The Humanists (4)
Seminar—3 hours. French humanism in its most varied forms. Although at different times Rabelais and Montaigne will be primarily studied, other leading intellectuals and religious writers will also receive attention. May be repeated for credit when different topic is studied.—I. (I.)

206A. Seventeenth-Century Literature: Theater (4)
Seminar—3 hours. Works of Corneille, Racine, Molière, and minor dramatists. One or more authors may be covered. May be repeated for credit with consent of instructor when different topics are studied.—II. (II.) Guynn, Peureux

206B. Seventeenth-Century Literature: Prose (4)
Seminar—3 hours; term paper and/or exposé. Works of authors such as Pascal, Descartes, Mme de Lafayette. One or more authors may be covered. May be repeated for credit with consent of instructor as different topics are studied from quarter to quarter.—I. (I.) Peureux

206C. Seventeenth-Century Literature: Poetry (4)
Seminar—3 hours; term paper and/or exposé. Studies of the works of one or more poets of the period. May be repeated for credit with consent of instructor.—III. (III.) Peureux

207A. Eighteenth-Century Literature: Philosophies (4)
Seminar—3 hours; term paper and/or exposé. Not a course in philosophy, but an examination of the role of philosophy in the design and context of literary works. Study of one or more authors. May be repeated for credit.—II. (II.) Simon

207B. Eighteenth-Century Literature: Novel (4)
Seminar—3 hours. Rise of the novel. Study of narrative experiments in the context of the philosophical climate and new literary values. Course may treat one or more novelists of the period. May be repeated for credit when different topics are studied.—III. (III.) Simon

208A. Nineteenth-Century Literature: Fiction (4)
Seminar—3 hours. Study of the works of one or several novelists and/or short-story writers of the period. May be repeated for credit with consent of instructor when different topics are studied.—I. (I.)

208B. Nineteenth-Century Literature: Poetry (4)
Seminar—3 hours. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor when different topics are studied.—III. (III.) Asquith

209A. Twentieth-Century: Prose (4)
Seminar—3 hours; term paper and/or exposé. Study of the works of one or several writers of the period.—II. (II.) Fort

209B. Twentieth-Century: Theater (4)
Seminar—3 hours; term paper and/or exposé. Study of the works of one or several dramatists of the period. May be repeated for credit with consent of instructor.—II. (II.) Fort

209C. Twentieth-Century: Poetry (4)
Seminar—3 hours; term paper and/or exposé. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor.—III. (III.) Asquith

210. Studies in Narrative Fiction (4)
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.—I. (I.)

211. Studies in Criticism (4)
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.—II. (II.)

212. Studies in the Theater (4)
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.—I. (I.)

213. Studies in Poetry (4)
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.—II. (II.) Asquith, Peureux

214. Study of a Literary Movement (4)
Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.—III. (III.)

215. Topics in French and Francophone Film (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Aspects of French and Francophone film from the Lumière Brothers through the present. Topics may include a specific historical period of filmmaking, film theories and the analysis of film form and narrative, and major filmmakers and filmic traditions. May be repeated two times for credit.—III. (III.)

224. Francophone Literatures (4)
Seminar—3 hours; term paper. Study of cultural productions (literature, film, visual arts) by Francophone peoples such as found in North Africa, West Africa, the Caribbean, South-East Asia, the Americas, and Metropolitan France. May be repeated for credit when topic differs and with consent of instructor.—Adejunmobi

250A. French Linguistics I (4)
Seminar—3 hours; term paper. Theoretical approach to the forms and functions of French, with emphasis on phonology and morphology. Overview of current linguistic theories and their application to French. Offered in alternate years.—(II.) Russell Webb

250B. French Linguistics II (4)
Seminar—3 hours; term paper. Theoretical approach to the forms and functions of French, with emphasis on syntax and semantics. Overview of current linguistic theories and their application to French. Offered in alternate years.—(II.) Russell Webb

251. Topics in the Linguistic Study of French (4)
Seminar—3 hours; term paper. Prerequisite: course 201, 250A or 250B, or consent of the instructor. Questions relevant to the linguistic study of French, such as language acquisition, sociolinguistics, or theoretical examination of structure. Intended for students in French Linguistics and those applying linguistic models to literature or teaching. May be repeated for credit when topic differs.—III. (III.) Russell Webb

291. Foreign Language Learning in the Classroom (4)
Seminar—3 hours; project. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (Same course as German 291 and Spanish 291.)—I, II. (I, II.) Arnett, Blake, Bradley

297. Individual Study (1-5)
(S/U grading only.)

298. Group Study (1-5)
Seminar—1-5 hours. May be repeated for credit with consent of instructor.

299. Research (1-12)
(S/U grading only.)

299D. Dissertation Research (1-12)
(S/U grading only.)

Professional Courses

300. Teaching of a Modern Foreign Language (3)
Lecture/discussion—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.—III. (III.)

390A. The Teaching of French in College (2)
Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. May be repeated for credit with consent of instructor. (S/U grading only.)—I. (I.) Russell Webb

390B. The Teaching of French in College (2)
Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Course designed for graduate teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (S/U grading only.)—II. (II.) Russell Webb

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Freshman Seminar Program

Winder McConnell, Ph.D., Program Director

Program Office. 1350 Surge III (Teaching Resources Center) (530) 752-6050; http://trc.ucdavis.edu/?page_id=42

Committee in Charge

Amy Clarke, Ph.D. *(University Writing Program)*
Peter Cranston, Ph.D. *(Entomology)*
Christiana Darwent, Ph.D. *(Anthropology)*
David Fahy, Ph.D. *(East Asian Languages & Cultures)*
Jon Rossini, Ph.D. *(Theatre & Dance)*
Yuuko Uchikoshi, Ph.D. *(School of Education)*
W. Jeffrey Weidner, Ph.D. *(Neurobiology, Physiology and Behavior)*

Courses in Freshman Seminar (FRS)

Questions pertaining to the following course should be directed to the instructor or to the Teaching Resources Center.

Lower Division Courses

1. First-Year Seminar (1)
Seminar—1 hour. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one freshman seminar, but may not take more than one in any given quarter. May be repeated for credit if topic differs.—I, II, III. (I, II, III.)

2. First-Year Seminar (2)
Seminar—2 hours. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one freshman seminar, but may not take more than one in any given quarter. May be repeated for credit if topic differs.—I, II, III. (I, II, III.)

3. First-Year Seminar (1)
Seminar—1 hour. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one freshman seminar, but may not take more than one in any given quarter. May be repeated for credit if topic differs. (P/NP grading only.)—I, II, III. (I, II, III.)

4. First-Year Seminar (2)
Seminar—2 hours. Open only to: students who have completed fewer than 45 quarter units; transfer students in their first academic year at UC Davis. Investigation of a special topic through shared readings, discussions, written assignments, term papers, and special activities (such as fieldwork, site visits, laboratory work, etc.). Emphasis placed upon student participation in learning. Students may take more than one freshman seminar, but may not take more than one in any given quarter. May be repeated for credit if topic differs. (P/NP grading only.)—I, II, III. (I, II, III.)

Fungal Biology and Ecology

(College of Agricultural and Environmental Sciences)

The minor in Fungal Biology and Ecology is open to all students interested in a concentrated exposure to and knowledge of the fungi and allied organisms.

The minor is sponsored by the Plant Pathology Department.

Minor Program Requirements:

UNITS

Fungal Biology and Ecology..... 18-20

Plant Pathology 130, 148, 150..... 11
Select 7-9 units from Food Science and Technology 104, Medical Microbiology and Immunology 130, Plant Sciences 146, Plant Pathology 40, 135, 151, Science and Society 30, Soil Science 111, 112; Plant Pathology 224 (available to advanced students with consent of instructor)..... 7-9

Minor Adviser. J. D. MacDonald

Genetics

See Molecular and Cellular Biology, on page 417; and Genetics (A Graduate Group), on page 312.

Genetics (A Graduate Group)

David Neale, Ph.D., Chairperson of the Group

Group Office. 310 Life Sciences (530) 752-4863; http://biosci2.ucdavis.edu/ggc/ggg

Faculty

Steffen Abel, Ph.D., Professor *(Plant Sciences)*
Danika Bannasch, Ph.D. Associate Professor *(VM: Population Health and Reproduction)*
Diane Beckles, Ph.D., Assistant Professor *(Plant Sciences)*
David Begun, Ph.D., Professor *(Evolution and Ecology)*
Craig Benham, Ph.D., Professor *(Genome Center)*
Alan B. Bennett, Ph.D., Professor *(Plant Sciences)*
Linda F. Bisson, Ph.D., Professor *(Viticulture and Enology)*
John Bowman, Ph.D., Adjunct Professor *(Plant Biology)*
Simeon Boyd, Ph.D., Associate Professor *(Pediatrics, M.I.N.D. Institute)*
Siobhan M. Brady, Ph.D., Assistant Professor *(Plant Biology)*
Anne Bagg Britt, Ph.D Professor *(Plant Biology)*
Sean Burgess, Ph.D., Associate Professor *(Molecular and Cellular Biology)*
Kenneth C. Burtis, Ph.D., Professor *(Molecular and Cellular Biology)*
Judy Callis, Ph.D., Professor *(Molecular and Cellular Biology) Academic Senate Distinguished Teaching Award*
Simon Chan, Ph.D., Assistant Professor *(Plant Biology)*
Frederic Chedin, Ph.D., Assistant Professor *(Molecular and Cellular Biology)*
Hongwu Chen, Ph.D., Associate Professor *(Biochemistry and Molecular Medicine)*
Roger Chetelat, Ph.D., Associate Agronomist *(Plant Sciences)*
Gitta L. Coaker, Ph.D., Assistant Professor *(Plant Pathology)*
Douglas Cook, Ph.D., Professor *(Plant Pathology)*
Luca Comai, Ph.D., Professor *(Plant Biology)*
Gino A. Cortopassi, Ph.D., Professor *(Molecular Biosciences)*
Michael E. Dahmus, Ph.D., Professor *(Molecular and Cellular Biology)*
Abhaya Dandekar, Ph.D., Professor *(Plant Sciences)*
Satya Dandekar, Ph.D., Professor *(Microbiology and Immunology)*
Mary Delany, Ph.D., Professor and Chair *(Animal Science)*
Bruce Draper, Ph.D., Assistant Professor *(Molecular and Cellular Biology)*
Jorge Dubcovsky, Ph.D., Professor *(Plant Sciences)*
Jan Dvorak, Ph.D., Professor *(Plant Sciences)*
JoAnne Engebrecht, Ph.D., Professor *(Molecular and Cellular Biology)*
Holly Ernest D.V.M., Ph.D., Assistant Professor *(Population Health and Reproduction)*
Thomas R. Famula, Ph.D., Professor *(Animal Science)*
Peggy Farnham, Ph.D., Professor *(Pharmacology & Toxicology)*
Charles S. Gasser, Ph.D., Professor *(Molecular and Cellular Biology)*
Paul Gepts, Ph.D., Professor *(Plant Sciences)*
Robert L. Gilbertson, Ph.D., Professor *(Plant Pathology)*
David G. Gilchrist, Ph.D., Professor *(Plant Pathology)*
Thomas Gradziel, Ph.D., Professor *(Plant Sciences)*
Paul J. Hagerman, Ph.D., Professor *(Biochemistry and Molecular Medicine)*
Nobuko Hagiwara, Ph.D., Assistant Professor *(Cardiovascular Medicine)*
John H. Harada, Ph.D., Professor *(Plant Biology) Academic Senate Distinguished Teaching Award*
James A. Harding, Ph.D., Professor *(Plant Sciences)*
Stacey Harmer, Ph.D., Assistant Professor *(Plant Biology)*
Wolf-Dietrich Heyer, Ph.D., Professor *(Microbiology)*
Russell Hovey, Ph.D., Associate Professor *(Animal Science)*
Liping Huang, Ph.D., Assistant Adjunct Professor *(Nutrition)*
Neil Hunter, Ph.D., Associate Professor *(Microbiology)*
Marie Jasieniuk, Ph.D., Assistant Professor *(Plant Sciences)*
Clarence I. Kado, Ph.D., Professor *(Plant Pathology)*
Sree Kanthaswamy, Ph.D., Assistant Researcher *(Veterinary Genetics, Forensics)*
Daniel Kliebenstein, Ph.D., Associate Professor *(Plant Sciences)*
Paul Knoepfler, Ph.D., Assistant Professor *(Cell Biology and Human Anatomy)*
Artyom Kopp, Ph.D., Assistant Professor *(Evolution and Ecology)*
Ian Korf, Ph.D., Assistant Professor *(Molecular and Cellular Biology)*
Stephen C. Kowalczykowski, Ph.D., Professor *(Microbiology)*
Dietmar Kueltz, Ph.D., Associate Professor *(Animal Science)*
Hsing-Jien Kung, Ph.D., Professor *(Biochemistry and Molecular Medicine)*
Kit Lam, Ph.D., Professor *(Hematology and Oncology)*

Charles Langley, Ph.D., Professor *(Evolution and Ecology)*
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Leslie A. Lyons, Ph.D., Associate Professor *(Population Health and Reproduction)*
Philip Mack, Ph.D., Assistant Adjunct Professor *(Hematology and Oncology)*
Julin Maloof, Ph.D., Assistant Professor *(Plant Biology)*
Bernie May, Ph.D., Professor *(Animal Science)*
Juan F. Medrano, Ph.D., Professor *(Animal Science)*
Frederick J. Meyers, Ph.D., Professor *(Hematology and Oncology)*
Richard Michelmore, Ph.D., Professor *(Plant Sciences)*
Maria Mudryj, Ph.D., Associate Professor *(Microbiology and Immunology)*
James D. Murray, Ph.D., Professor *(Animal Science)*
Jeanette E. Natzle, Ph.D., Associate Professor *(Molecular and Cellular Biology)*
David Neale, Ph.D., Professor *(Plant Sciences)*
Anita M. Oberbauer, Ph.D., Professor *(Animal Science)*
Dan E. Parfitt, Ph.D., Pomologist *(Plant Sciences)*
Niels Pedersen, Ph.D., D.V.M., Professor *(VM: Medicine and Epidemiology)*
Cecilia Penedo, Ph.D., Associate Research Geneticist *(Veterinary Genetics Laboratory)*
Martin L. Privalsky, Ph.D., Professor *(Microbiology)*
Carlos F. Quiros, Ph.D., Professor *(Plant Sciences)*
Kathryn L. Radke, Ph.D., Professor *(Animal Science)*
Pamela C. Ronald, Ph.D., Professor *(Plant Pathology)*
Alan Rose, Ph.D., Associate Project Scientist *(Molecular and Cellular Biology)*
Lesilee Rose, Ph.D., Associate Professor *(Molecular and Cellular Biology)*
John Roth, Ph.D., Professor *(Microbiology)*
Earl Sawai, Ph.D., Associate Adjunct Professor *(Pathology)*
Carl W. Schmid, Ph.D., Professor Emeritus *(Molecular and Cellular Biology)*
David Segal, Ph.D., Associate Professor *(Pharmacology and Toxicology)*
Michael F. Seldin, Ph.D., Professor *(Biochemistry and Molecular Medicine)*
Barbara L. Shacklett, Ph.D., Associate Professor *(Microbiology and Immunology)*
Frank Sharp, Ph.D., Professor *(Neurology)*
Douglas Shaw, Ph.D., Professor *(Plant Sciences)*
Neelima Sinha, Ph.D., Professor *(Plant Biology)*
Dina St. Clair, Ph.D., Professor *(Plant Sciences)*
Daniel Starr, Ph.D., Assistant Professor *(Molecular and Cellular Biology)*
Venkatesan Sundaresan, Ph.D., Professor *(Plant Biology)*
Michael Syvanen, Ph.D., Professor *(Microbiology and Immunology)*
Thomas Tai, Ph.D., Associate in AES *(Plant Sciences)*
Larry R. Teuber, Ph.D., Professor *(Plant Sciences)*
Alison Van Eenennaam, Ph.D., Cooperative Extension Specialist *(Animal Science)*
M. Andrew Walker, Ph.D., Professor *(Viticulture and Enology)*
Craig H. Warden, Ph.D., Professor *(Pediatrics)*
Valerie M. Williamson, Ph.D., Professor *(Nematology)*
Reen Wu, Ph.D., Professor *(Pulmonary/Critical Care Med)*
Lifeng Xu, Ph.D., Assistant Professor *(Microbiology)*
John I. Yoder, Ph.D., Professor *(Plant Sciences)*
Mark A. Zern, Ph.D., Professor (*Internal Med: Transplant)*
Chengji Zhou, Ph.D., Assistant Professor *(Cell Biology and Human Anatomy)*

Graduate Study. The Graduate Group in Genetics offers programs of study and research leading to the M.S. and Ph.D. degrees. To optimize the breadth available for student training and faculty interaction while still providing the opportunity for focused curricula, Focus Groups (FGs) in Animal Genomics, Chromosome Biology, Human Genetics, Model Plants, and Plant Breeding & Biodiversity have been created within the graduate group. These focus groups consist of clusters of labs with similar research interests; faculty members belong to one or more focus groups. Each group provides broad training in genetics combined with an emphasis specific to its area. Students choose their focus group affiliation based on their research interests and the membership of their major professor. For additional information regarding the program, contact the group coordinator (530) 752-4863.

Graduate Advisers. A. Britt *(Plant Biology)*, M. Delany *(Animal Science)*, H. Ernest *(VM: Population Health and Reproduction)*, D. Gilchrist *(Plant Pathology)*, N. Hagiwara *(Med: Cardiovascular Medicine)*, R. Hovey *(Animal Science)*, L. Huang *(Nutrition)*, J. LaSalle *(Medical Microbiology and Immunology)*, B. May *(Animal Science)*, M. Mudryj *(Medical Microbiology and Immunology)*, K. Radke *(Animal Science)*, A. Walker *(Viticulture and Enology)*

Courses in Genetics (GGG)

Graduate Courses

201A. Advanced Genetic Analysis (5)
Lecture/discussion—5 hours. Prerequisite: Biological Sciences 101, Statistics 100 or the equivalent, graduate standing. Fundamentals of genetic analysis and chromosome structure using model organisms including mutation, transmission, complementation, suppression, and enhancement as well as epigenetic phenomena at the whole organism and molecular levels.—I. (I.)

201B. Genomics (5)
Lecture—3 hours; discussion—2 hours. Prerequisite: course 201A, 201C or the equivalent. Prokaryotic and eukaryotic genomes. Experimental strategies and analytical challenges of modern genomics research and the theory and mechanics of data analysis. Structural, functional, and comparative genomics. Related issues in bioinformatics.—I. (I.)

201C. Molecular Biology (4)
Lecture—4 hours. Prerequisite: Molecular and Cellular Biology 221A or the equivalent. Pass 1 restricted to graduate students in biochemistry and molecular biology, microbiology, or genetics. Structure and organization of DNA and chromatin; DNA replication, repair and recombination; transcription and RNA processing; protein biosynthesis and turnover; transcriptional and post-transcriptional control mechanisms; examples from eukaryotic and eubacterial cells, and virsuses. (Same course as Molecular and Cellular Biology 221C.)—III. (III.)

201D. Quantitative and Population Genetics (5)
Lecture—5 hours. Prerequisite: course 201A or consent of instructor. Basic concepts of quantitative and population genetics including gene and genotypic frequencies, multiple factor hypothesis, phenotypic and genotypic values, heritability, selection, genetic variation, the detection of quantitative trait loci and evolution in populations. Experimental and analytical methods.—II. (II.)

205. Molecular Genetics Laboratory (5)
Laboratory—15 hours. Prerequisite: Biological Sciences 101 (may be taken concurrently) or the equivalent, enrolled in Genetics Graduate Group. Students will conduct experiments in molecular genetics laboratories. Individual research problems will emphasize experimental design, experience with methodologies, and data interpretation. May be repeated up to three times for credit. (S/U grading only.)—I, II, III. (I, II, III.)

210. Horizontal Gene Transfer (3)
Lecture/discussion—3 hours. Prerequisite: background in basic microbiology and genetics required; introductory course in molecular biology, biotechnology and microbial and animal/plant genetics recommended. Transfer of genes between unrelated organisms in nature. Dissemination of foreign DNA from genetically engineered organisms, including plants and animals. Mechanisms by which genes are transferred horizontally, and between kingdoms.—I. (I.)

211. Concepts in Human Genetics and Genomics (3)
Lecture/discussion—3 hours. Prerequisite: course 201A or the equivalent; course 201B, 201C or the equivalent recommended. Human genomic organization; genetic structure of populations; positional cloning, application of linkage, association, and haplotypes; quantitative trait loci analyses; integrative genetic studies of gene expression; DNA repair mechanisms in genetic disease; mutation analyses; epigenetics; mitochondrial disease; gene manipulation and therapy.—II.

220. Genomics and Biotechnology of Plant Improvement (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101 or the equivalent. Integration of modern biotechnology and classical plant breeding including the impact of structural, comparative and functional genomics on gene discovery, characterization and exploitation. Also covers molecular markers, plant transformation, hybrid production, disease resistance, and novel output traits. (Same course as Plant Sciences 220.)—II. (II.)

291. Seminar in History of Genetics (2)
Seminar—2 hours. Prerequisite: Biological Sciences 101. The development of modern genetic theories beginning with Mendel.—I. (I.)

292. Seminar in Plant Breeding and Biodiversity (1-3)
Topics of current interest in plant breeding and biodiversity. May be repeated for credit. Offered in alternate years. (S/U grading only.)—(I.)

293. Seminar in Animal Genetics (1-3)
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Emphasis on recent advances in the field of animal genetics, ranging from quantitative genetics to molecular biology as it relates to animals.—III.

294. Seminar in Human Genetics (2)
Seminar—2 hours. Prerequisite: course 201A and consent of instructor. May be repeated for credit up to five times if topic differs. Topics of current interest in human genetics and genomics. Offered in alternate years.—(II.)

295. Seminar in Molecular Genetics (1-3)
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Topics of current interest related to the structure, modification and expression of genes.—III.

296. Scientific Professionalism and Integrity (2)
Lecture—1 hour; seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Review of basic skills required of contemporary scientists. Topics include scientific conduct, manuscript preparation, grant writing, seminar presentations, and time management. Emphasis on responsibilities of scientists to factually and thoughtfully communicate results. (S/U grading only.)—I. (I.)

297. Seminar in Plant Genetics (1-3)
Seminar—1-3 hours. Prerequisite: course 201A or consent of instructor. Current topics in plant genetics will be examined in student-conducted seminars and discussion format. The integration of molecular, organismal and population genetics to address questions in plant biology will be emphasized.—(II.)

298. Group Study (1-5)
Prerequisite: consent of instructor. Group study of selected topics in genetics. (S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Course

300. Methods in Teaching Genetics (1-3)
Lecture/discussion. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching genetics. Includes analysis of texts and supporting material, discussion of teaching techniques, preparing for and

conducting discussion or laboratory sections, formulating examinations under supervision of instructor. May be repeated for credit up to 3 times or 9 units if teaching in different genetics related course. (S/U grading only.)—I, II, III.

Geographic Information Systems

(College of Agricultural and Environmental Sciences)

The Department of Biological and Agricultural Engineering offers a minor in Geographic Information Systems with an emphasis on spatial analysis. This minor is ideal for students interested in information processing of spatial data related to remote sensing, land information systems, marine cartography, thematic mapping, surface modeling, environmental modeling resources management, public utility planning, emergency response, geomarketing, geotechnics, archaeology, military exercises, and computer-aided design. Prerequisites include Mathematics 16A-16B, Statistics 13 or Plant Sciences 120 or Civil and Environmental Engineering 114, and Plant Sciences 21 or Computer Science Engineering 15.

Minor Program Requirements:

UNITS

Geographic Information Systems..... 18

Applied Biological Systems Technology 180, 181N, Environmental and Resource Sciences 186, 186L.....13

Select five or more units from Plant Sciences 121, Applied Biological Systems Technology 175, Applied Biological Systems Technology/ Hydrologic Science 182, Environmental Science and Policy 179, 179L.....5

Minor Advisers. R.E. Plant *(Plant Sciences)*

Geographic Studies

(College of Agricultural and Environmental Sciences)

The interdepartmental minor in Geographic Studies is defined by its concern with place. Geographers strive to answer spatial questions regarding the earth's surface; to describe and explain the character of regions; to ascertain the ways in which historical and contemporary humans have used and shaped the earth's surface; and to understand the interactions of physical, biotic, and human systems within our global environment. The minor is compatible with a variety of environmental majors in the college and also with graduate programs in geography.

The minor is sponsored by the Department of Environmental Design.

Geography

See Geography (A Graduate Group), below.

Geography (A Graduate Group)

Chris Benner, Ph.D., Chairperson of the Group

Group Office. Carrie Armstrong-Ruport, Program Coordinator; 133 Hunt Hall (530) 752-4119; caruport@ucdavis.edu

Faculty

Chris Benner, Ph.D., Associate Professor *(Human and Community Development)*
Monique Borgerhoff Mulder, Ph.D, Professor *(Anthropology)*
Stephen Boucher, Ph.D, Associate Professor *(Agricultural and Resource Economics)*
Cynthia Brantley, Ph.D, Professor *(History)*
Mary Cadenasso, Ph.D, Assistant Professor *(Plant Sciences)*
Tim Caro, Ph.D, Professor *(Wildlife, Fish and Conservation Biology)*
Diana Davis, Ph.D. Associate Professor *(History)*
Adela de la Torre, Ph.D., Professor *(Chicana/o Studies)*
Deborah L. Elliott-Fisk, Ph.D., Sr. Lecturer, SOE *(Wildlife, Fish, and Conservation Biology)*
Patsy Eubanks Owens, M.L.A., Associate Professor *(Landscape Architecture)*
Mark Francis, M.L.A., Professor *(Landscape Architecture)*
Ryan Galt, Ph.D., Assistant Professor *(Human and Community Development)*
Charles Goldman, Ph.D., Professor *(Environmental Science and Policy) Distinguished Graduate Mentoring Award*
Steven Greco, Ph.D., Associate Professor (Landscape Architecture)
Luis Guarnizo, Ph.D, Professor *(Human and Community Development)*
Susan Handy, Ph.D., Professor *(Environmental Science and Policy)*
Lynette Hart, Ph.D., Professor *(Population Health and Reproduction)*
Robert Hijmans, Ph.D, Assistant Professor *(Environmental Science and Policy)*
Frank Hirtz, L.L.D., Ph.D., Associate Professor *(Human and Community Development)*
Lovell (Tu) Jarvis, Ph.D., Professor *(Agricultural and Resource Economics)*
Carl Keen, Ph.D., Professor *(Nutrition)*
Martin Kenney, Ph.D., Professor *(Human and Community Development)*
Nguyen Kien, Ph.D., Professor *(Anesthesiology)*
A. Peter Klimley, Ph.D., Adjunct Professor *(Wildlife, Fish and Conservation Biology)*
David Kyle, Ph.D., Associate Professor *(Sociology)*
Jonathon London, Ph.D, Assistant Professor *(Human and Community Development)*
Jeff D. Loux, Ph.D., Assistant Adjunct Professor *(Landscape Architecture)*
Mark Lubell, Ph.D., Associate Professor *(Environmental Science and Policy)*
Jay R. Lund, Ph.D., Professor *(Civil and Environmental Engineering)*
E. Steve McNiel, M.L.A., Sr. Lecturer, SOE *(Landscape Architecture)*
Jay Mechling, Ph.D., Professor *(American Studies)*
Luz Mena, Ph.D., Assistant Professor *(Women and Gender Studies)*
Patricia Mohktarian, Ph.D., Professor *(Civil and Environmental Engineering)*
Catherine J. Morrison Paul, Ph.D., Professor *(Agricultural and Resource Economics)*
Jeffrey Mount, Ph.D., Professor *(Geology)*
Peter B. Moyle, Ph.D., Professor *(Wildlife, Fish and Conservation Biology)*
Kimberly Nettles, Ph.D., Associate Professor *(Women and Gender Studies)*
Ben Orlove, Ph.D., Professor *(Environmental Science and Policy)*
Richard Plant, Ph.D., Professor *(Plant Sciences)*
James Quinn, Ph.D., Professor *(Environmental Science and Policy)*
Michael Rios. Ph.D., Associate Professor *(Landscape Architecture)*
Lynn Roller, Ph.D., Professor *(Classics, Art History)*
Art Shapiro, Ph.D., Professor *(Evolution and Ecology)*
Michael P. Smith, Ph.D., Professor *(Human and Community Development)*
Daniel Sumner, Ph.D., Professor *(Agricultural and Resource Economics)*
Margaret Swain, Ph.D., Associate Adjunct Professor *(Women and Gender Studies)*
Julie Sze, Ph.D., Assistant Professor *(American Studies)*
Thomas P. Tomich, Ph.D., Professor *(Human and Community Development)*
Susan Ustin, Ph.D., Professor *(Land, Air and Water Resources)*
Stefano Varese, Ph.D., Professor *(Native American Studies)*
Charles Walker, Ph.D., Associate Professor *(History)*
Wesley W. Wallender, Ph.D., Professor *(Land, Air and Water Resources)*
Stephen Wheeler, Ph.D., Associate Professor *(Landscape Architecture)*
Truman Young, Ph.D., Professor *(Plant Sciences)*
Minghua, Zhang, Ph.D., Adjunct Professor *(Land Air and Water Resources)*

Emeriti Faculty

Michael Barbour, Ph.D., Professor Emeritus *(Plant Sciences)*
David Boyd, Ph.D., Associate Professor Emeritus *(Anthropology)*
Stephen Brush, Ph.D., Professor Emeritus *(Human and Community Development)*
Thomas A. Cahill, Ph.D., Professor Emeritus
Dennis Dingemans, Ph.D., Associate Professor Emeritus *(Geography)*
Isao Fujimoto, Ph.D., Senior Lecturer SOE Emeritus *(Human and Community Development)*
James Grieshop, Ph.D., Specialist in Cooperative Extension Emeritus *(Human and Community Development)*
Louis Grivetti, Ph.D., Professor Emeritus *(Nutrition)*
Jack Ives, Ph.D., Professor Emeritus
Stephen Jett, Ph.D., Professor Emeritus
Dean MacCannell, Ph.D., Professor Emeritus *(Landscape Architecture)*
Janet Momsen, Ph.D., Professor Emeritus *(Human and Community Development)*
David Robertson, Ph.D., Professor Emeritus *(English)*
Robert L. Thayer, Jr., M.A., Professor Emeritus *(Landscape Architecture)*
Geoffrey Wandesforde-Smith, Ph.D., Associate Professor Emeritus
Miriam J. Wells, Ph.D., Professor Emeritus *(Human and Community Development)*

Affiliated Faculty

Joan Florsheim, Ph.D., Associate Research Scientist *(Geology)*
Joyce Gutstein, Ph.D., Director *(Public Service Research Program-JMIE)*
James Hill, Ph.D., Specialist in Cooperative Extension *(Plant Sciences)*
Eric Larsen, Ph.D., Associate Research Scientist *(Landscape Architecture)*
F. Thomas Ledig, Ph.D., Adjunct Professor *(Plant Sciences)*
Greg McPherson, Ph.D., Lecturer and Associate in the Agricultural Experiment Station
Lorence Oki, Ph.D, Associate Specialist in Cooperative Extension *(Plant Sciences and Landscape Architecture)*
Kenneth Tate, Ph.D., Specialist in Cooperative Extension *(Plant Sciences)*
James Thorne, Ph.D. Research Scientist *(Environmental Science and Policy)*
Joshua Viers, Ph.D, Assistant Research Scientist *(Environmental Science and Policy)*

Graduate Study. The Graduate Group in Geography (GGG) offers programs of study and research leading to the M.A. and Ph.D. degrees. Faculty and students share a common interest in spatial interaction between humans and the biophysical environ-

ment. The wide faculty interests attract a diverse set of students in such areas as biogeography, urban forestry and related natural science and engineering fields, as well as human geography and related social science fields. A number of faculty members use and teach geographic information systems, remote sensing, and related geographic techniques, and most have a strong field orientation. The strengths of the Davis campus and its faculty enable the program to focus on important issues including people, place and power, community and regional identity and change, people-environment interaction, agricultural sustainability, landscape architecture, environmental change, biogeography, natural resource management, and technological innovations in computing and the use of geographic information. Students are mentored by faculty across the many colleges of the university.

Preparation. Most students considered for admission will have an undergraduate major in geography or in a closely related field. Generally, a student without an undergraduate degree in geography will be required to complete the equivalent of a minor in geography, consisting of one course each in human geography, physical geography and geographic methods, plus any additional undergraduate coursework required as background for the student's research emphasis, as determined by the student's guidance committee.

Graduate Advisers. D. Elliott-Fisk *(Wildlife, Fish and Conservation Biology)*, S. Greco *(Landscape Architecture)*

Courses in Geography (GEO)

Graduate Courses

200A. Research Trends in Geography (1)
Seminar—1 hour. Major current research themes and trends in geography. (S/U grading only.)—I. (I.)

200B. Geographical Concepts (4)
Lecture—3 hours; term paper. Prerequisite: undergraduate course work in geography or consent of instructor; graduate standing. Survey of key concepts and thematic content of the discipline of geography, including the role of science and humanism, the classical context of the discipline, and process, structure and scale.—I. (I.)

200C. Theory and Practice of Geography (4)
Lecture—3 hours; term paper. Prerequisite: graduate standing. Development of geographical theory; key concepts and theories; their chronology, and application to the practice of geography. Analytical background to geographical theory; application of theory to geographical practice and research projects.—II. (II.)

201. Sources and General Literature of Geography (4)
Discussion—4 hours. Prerequisite: graduate standing in geography; consent of instructor. Designed for students preparing for higher degrees in geography. May be repeated for credit in one or more of the following subfields: physical, cultural, economic, urban, historical, political, conservation, and regional geography.

210. Topics in Biogeography (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Evolution and Ecology 147 or Wildlife, Fish, and Conservation Biology 156 (may be taken concurrently) or equivalent; consent of instructor for undergraduates. Current topics in historical and ecological biogeography, including macroecology and areography, GIS and remote sensing, phylogeography, vegetation, plant and animal community and species geography. Systematics, climate change, and conservation will be addressed. Offered in alternate years.

211. Physical Geography Traditions and Methods (3)
Lecture/discussion—2 hours; term paper. Prerequisite: Introductory course in physical geography. Graduate-level standing in geography or related discipline. Course Description: Discussion of the physical science tradition in geography, including key concepts and current research in climatology, geomorphology, soils geography, biogeography, climate change, watershed science, and coastal studies. Research paradigms, programs, and methods as used by physical geographers will be discussed. May be repeated three times for credit. Offered in alternate years.—I. Elliott-Fisk

280. Field Studies in Geography (3)
Lecture—1 hour; fieldwork—6 hours. Prerequisite: undergraduate or graduate coursework in geography and consent of instructor. A topic or subdiscipline of geography will form the theme for the course in any given offering, with a focus on current research on this topic, field methodologies, and data analysis in human and physical geography. May be repeated two times for credit. Limited enrollment.

290. Seminar in Geography (1-3)
Seminar—1-3 hours. Prerequisite: Graduate standing or consent of instructor. The seminar will focus on specified topical areas within geography, which will vary quarter to quarter. Students will be expected to present an oral seminar on an aspect of the general topic under discussion. May be repeated six times for credit. (S/U grading only.)—I, II, III. (I, II, III.)

291. Seminar in Cultural Geography (4)
Seminar—3 hours.

293. Graduate Internship (1-12)
Prerequisite: consent of instructor. Individually designed, supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

295. Seminar in Urban Geography (4)
Seminar—3 hours.—II. (II.)

297. Graduate Group in Geography Seminar (2)
Lecture/discussion—1 hour; term paper. Prerequisite: graduate standing. Seminars by UC Davis faculty and prominent national and international scholars; research presentations by Graduate Group in Geography Ph.D. candidates. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
(S/U grading only.)

299D. Individual Study (1-12)
Prerequisite: graduate student status in Geography and consent of instructor. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)

Geology

(College of Letters and Science)

Peter Schiffman, Ph.D., Chairperson of the Department

David A. Osleger, Ph.D., Vice-Chairperson of the Department

Department Office. 2119 Earth and Physical Sciences Building (530) 752-0350; *http://www.geology.ucdavis.edu*

Faculty

Magali I. Billen, Ph.D., Associate Professor
Sandra J. Carlson, Ph.D., Professor
William H. Casey, Ph.D., Professor *(Chemistry)*
Kari M. Cooper, Ph.D. Associate Professor
Eric S. Cowgill, Ph.D. Associate Professor
Howard W. Day, Ph.D., Professor
James A. Doyle, Ph.D., Professor (Evolution and Ecology)
Graham E. Fogg, Ph.D., Professor *(Land, Air and Water Resources)*
Tessa M. Hill, Ph.D., Assistant Professor
Louise H. Kellogg, Ph.D., Professor
Charles E. Lesher, Ph.D., Professor
James S. McClain, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Isabel P. Montañez, Ph.D., Professor
Ryosuke Motani, Ph.D. Professor
Jeffrey F. Mount, Ph.D., Professor
Alexandra Navrotsky, Ph.D., Professor *(Chemistry)*
David A. Osleger, Ph.D., Lecturer
John B. Rundle, Ph.D., Professor *(Physics, Geology)*
James R. Rustad, Ph.D., Professor
Peter Schiffman, Ph.D., Professor
Howard J. Spero. Ph.D., Professor
Dawn Y. Sumner, Ph.D., Professor
Donald L. Turcotte, Ph.D., Professor
Geerat J. Vermeij, Ph.D., Professor
Kenneth L. Verosub, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Qing-zhu Yin, Ph.D., Associate Professor
Robert A. Zierenberg, Ph.D., Professor

Emeriti Faculty

Richard Cowen, Ph.D., Senior Lecturer Emeritus,
Academic Senate Distinguished Teaching Award
John F. Dewey, Ph.D., Professor Emeritus
Charles G. Higgins, Ph.D., Professor Emeritus
Eldridge M. Moores, Ph.D., Professor Emeritus
Robert J. Twiss, Ph.D., Professor Emeritus

The Major Programs

"Civilization exists by geological consent—subject to change without notice."—Will Durant

Geology is the study of the Earth, and in particular its history, structure, and the processes that have molded our planet and its biosphere. Geology involves the origin of continents and ocean basins, earthquakes and volcanoes, variations in global climate, and how these physical changes impact the evolution of life. All of these planetary processes are viewed through the prism of 'deep time', a perspective unique to geologists and one that distinguishes geology from most of the other physical sciences.

A significant component of geology is oriented toward the interaction between humans and the Earth. This aspect includes the study of resources such as minerals, oil, and water; identification and mitigation of Earth hazards such as earthquakes, landslides, floods, and volcanic eruptions; identification and mitigation of polluted ground water; land use planning; and the study of ancient and modern climate change.

The Program. Students interested in becoming professional geologists or continuing their geological studies at the graduate level should chose the Bachelor of Science degree program. The Bachelor of Arts program is for students interested in an interdisciplinary program of study, or who plan to go into pre-college teaching. Both programs allow students to emphasize an aspect of the field of particular interest to them. The upper division electives are not restricted to geology courses but must be chosen to provide a relevant, coherent, and in-depth program of study. Transfer students should have completed as much as possible of the preparatory subject matter listed below.

Internships and Career Alternatives. In recent years in California, the largest employers of geologists have been environmental and geotechnical consulting firms, with oil companies, research laboratories and government agencies also providing opportunities. Students graduating with a Bachelor's degree may get entry-level positions in the private sector or they may go on to attain their teaching credential to fill the growing need for science teachers at all pre-college levels. A Master's degree is the most versatile professional level degree, and a Ph.D. is generally required for research and academic positions. Internships are strongly encouraged for undergraduates and are a means of exploring potential career opportunities that can lead to positions after graduation. UC Davis students have interned at the California Division of Mines and Geology, the State Department of Water Resources, CAL-EPA, and various consulting firms.

Education Abroad Options. The department strongly encourages interested students to pursue a portion of their studies abroad. Within the constraints of the campus and College residence requirements, it is possible for students to complete significant portions of the Geology major at an international institution provided that the student consults with one of the undergraduate advisers and carefully plans a course of study abroad that will complement their coursework at Davis. In recent years, UC Davis Geology majors have spent their junior or senior years completing upper division coursework at EAP partner institutions including the University of Leeds, the University of Edinburgh, and the University of Auckland.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 40-43

Geology 3, 3L, 50, 50L, 60 13
Mathematics 16A-16B or 21A-21B..... 6-8
Chemistry 2A-2B 10
Physics 7A-7B 8
Statistics 13 or 13AT or 32 or 102..... 3-4

Depth Subject Matter..... 36

Geology 100, 100L, 101, 101L, 103, 107, 107L, 108, 109, 109L 24
Additional upper division electives chosen from upper division courses in geology. Upper division courses in related fields may satisfy this requirement if approved in advance by the major adviser..... 12

Total Units for the Major..... 76-79

Recommended. Chemistry 2C or Hydrologic Science 134, Physics 7C.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 57-59

Geology 3, 3L, 50, 50L, 60, 62 15
Mathematics 21A-21B-21C 12
Chemistry 2A-2B 10
Select one of the following three options:

General Geology option:

Hydrologic Science 134 or Chemistry 2C 5-6
Statistics 32 or 102 3-4
Physics 7A-7B-7C or 9A-9B-9C 12

Geochemistry/Petrology option:

Hydrologic Science 134 or Chemistry 2C 5-6
Statistics 32 or 102 3-4
Mathematics 21D..... 4
Physics 9A-9B 8

Quantitative/Geophysics option:

Mathematics 21D and 22A 7
Physics 9A-9B-9C 12

Depth Subject Matter..... 52

Geology 100, 100L, 101, 101L, 103, 105, 106, 107, 107L, 108, 109, 109L, 110..... 40
Additional upper division electives chosen from Geology 130–190 courses, Hydrologic Science 144, 146 and related fields approved in advance by major adviser. No more than 3 units upper division elective credit for Geology 115–129 courses. Maximum of 6 units upper division elective credit for Geology 192 or 194A-194B or 194HA-194HB 12

Total Units for the Major..... 109-111

English Composition Requirement. It is recommended that all majors complete the English composition requirement (University Writing Program 101 or 102 or 104 or the equivalent) before or concurrently with the following courses: Geology 100, 101, 105N, 106, 108, 109L, 110.

Recommended. For the B.S. degree, one or more of the following courses are recommended for any of the options or to supplement the options as listed.

Note that Mathematics 22A is not a necessary prerequisite to Physics 9C:

General Geology option: Mathematics 21D, 22A, 22B, Physics 9A-9B-9C instead of 7A-7B-7C, Statistics 104, 106, 108.
Geochemistry/Petrology option: Mathematics 22A, Physics 9C, Hydrology 134 and Chemistry 2C, Chemistry 110A.
Quantitative/Geophysics option: Mathematics 22B, Statistics 32 or 102, Hydrology 134 or Chemistry 2C.

Major Advisers. D. A. Osleger, D. Y. Sumner, R.A. Zierenberg

Minor Program Requirements:

Students in other disciplines may elect to complete a minor in Geology by choosing a geological subject emphasis listed below. On transcripts the minor will appear as a minor in Geology.

UNITS

Geology 19-24

Select one of the five emphases below.

General Geology emphasis 19-20

Geology 50 (or 1) and 50L..... 5-6
Geology 100, 101, 109 and either 107 or 108..... 11
Geology 116 or 134 3

Minor Advisers. D. A. Osleger, D. Y. Sumner, R.A. Zierenberg

Engineering Geology emphasis..... 19-22

Geology 50 and 50L..... 5
Civil Engineering 171, 171L 5
Three courses chosen from Geology 134, 161, 162, Hydrologic Science 103, 144, 146, Soil Science 118, 120..... 9-12

Minor Adviser. R.A. Zierenberg

Geochemistry emphasis..... 19-22

Geology 60 and either 146 or 148 7
Chemistry 110A and 110B, or Materials Science and Engineering 130 and 134.... 6
Chemistry majors may substitute one of the elective courses for Chemistry 110B.
Two elective courses chosen from Chemistry 110C, Geology 108, 146, 148, Hydrologic Science 134, Soil Science 102..... 6-9
Chemistry 110C and Materials Science and Engineering 134 cannot both be counted toward the minor.

Minor Adviser. R.A. Zierenberg

Paleobiology emphasis 20-21

Geology 107 and 107L, 108..... 8
Geology 152 4
At least eight additional units from the following: Anthropology 151 or 152, Evolution and Ecology 100, 101, 102, 105, 112-112L, 140, 149, Geology 109, 150C 8-9

Minor Advisers. R. Motani or G. Vermeij

Science Teaching Credential. Students who might wish to become a teacher should consult an advisor in the Mathematics and Science Teaching Program (MAST; *http://mast.ucdavis.edu*) at their first opportunity in order to combine the prerequisites for a credential program with General Education requirements. MAST also offers seminars that give participants experience in elementary, middle school, and high school classrooms. Students hoping to teach Earth and Planetary Science may prepare by satisfying the requirements for the B.S. degree in Natural Science (*http://naturalsciences.ucdavis.edu*) or the A.B. degree in Geology (77-79 units) and 36 additional units of science as outlined below. Students may also prepare for the science credential by taking the B.S. degree in Geology (108-111 units) and an additional 24 units as indicated by the asterisks (*) below.

Biological Sciences 2A-2B-2C*..... 15
Chemistry 2C 5
Physics 7C 4
Mathematics 16C 3
Geology 36* 4
Geology 116N* 3

Teaching Credential Subject Representative. H.W. Day. See also the Teaching Credential/M.A. Program on page 114.

Graduate Study. The Department of Geology offers a program of study and research leading to the M.S. and Ph.D. degrees. For information regarding graduate study in geology, address the Graduate Adviser, Department of Geology.

Graduate Advisers. M.L. Billen, S. J. Carlson, I. P. Montañez

Courses in Geology (GEL)

Lower Division Courses

1. The Earth (4)
Lecture—3 hours; discussion—1 hour. Introduction to the study of the Earth. Earth's physical and chemical structure; internal and surface processes that mold the Earth; geological hazards and resources. Not open for credit to students who have completed course 50. Only 2 units of credit to students who have completed course 2. GE credit: SciEng.—I, II, III. (I, II, III.) Osleger, Verosub

2. The Blue Planet: Introduction to Earth Science (3)
Lecture—3 hours. Study of the solid and fluid earth and its place in the solar system. Holistic examination of how the solid earth interacts with the atmosphere, hydrosphere, biosphere, and extraterrestrial environment. Not open for credit to students who have completed course 50. Only 2 units of credit to students who have completed course 1. GE credit: SciEng.—I. (I.)

2G. The Blue Planet: Introduction to Earth Science Discussion (1)
Discussion—1 hour. Prerequisite: course 2 concurrently. Small group discussion and preparation of short papers for course 2. GE credit with concurrent enrollment in course 2: Wrt.—I. (I.)

3. History of Life (3)
Lecture—3 hours. Prerequisite: course 1 recommended. The history of life during the three and one-half billion years from its origin to the present day. Origin of life and processes of evolution; how to visualize and understand living organisms from their fossil remains. GE credit: SciEng.—II. (II.) Motani

3G. History of Life: Discussion (1)
Discussion—1 hour. Prerequisite: course 3 concurrently. Small group discussion and preparation of short papers for course 3. GE credit with concurrent enrollment in course 3: Wrt.—II. (II.) Motani

3L. History of Life Laboratory (1)
Laboratory—3 hours. Prerequisite: course 3 concurrently. Exercises in understanding fossils as the clues to interpreting ancient life, including their functional morphology, paleoecology, and evolution.—II. (II.) Motani

4. Evolution: Science and World View (3)
Lecture—2 hours; discussion—1 hour. Introduction to biological evolution. Emphasis on historical development, major lines of evidence and causes of evolution; relationships between evolution and Earth history; the impact of evolutionary thought on other disciplines. GE credit: SciEng.—I. (I.) Vermeij

10. Modern and Ancient Global Environmental Change (3)
Lecture—3 hours. Fundamental scientific concepts underlying issues such as global warming, pollution, and the future of nonsustainable resources presented in the context of anthropogenic processes as well as natural forcing of paleoenvironmental change throughout Earth's history. GE credit: SciEng.—III. (III.) Montañez

12. Evolution and Paleobiology of Dinosaurs (2)
Lecture—2 hours. Introduction to evolutionary biology, paleobiology, ecology and paleoecology, using dinosaurs as case studies.—II. (II.) Carlson

16. The Oceans (3)
Lecture—3 hours. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents and chemistry of water, geological history, the seas biota and human utilization of marine resources. Not open for credit to students who have taken course 116. GE Credit: SciEng—II. III. (II, III.) Hill, Spero

16G. The Oceans: Discussion (2)
Discussion/laboratory—2 hours; term paper or discussion. Prerequisite: course 16 (concurrent). Scientific method applied to discovery of the processes, biota and history of the oceans. Group discussion and preparation of term paper. Not open for credit to students who have taken course 116G. GE Credit: SciEng, Wrt.—II. (II.) Hill, Spero

17. Earthquakes and Other Earth Hazards (2)
Lecture—2 hours. The impact of earthquakes, volcanoes, landslides and floods on Man, his structures and his environment. Discussion of the causes, effects, and solution of geologic problems in rural and urban settings.—I, III. (I, III.) Billen, Kellogg

18. Energy and the Environment (3)
Lecture—3 hours. Conventional and alternative energy resources and their environmental impacts. Basic principles, historical development, current advantages and disadvantages, future prospects. Oil, natural gas, coal, nuclear, wind, geothermal, water, tidal, solar, hydrogen, and other sources of energy for the 21st century. GE Credit: SciEng.—II. (II.) Verosub

20. Geology of California (2)
Lecture—2 hours. The geologic history of California, the origin of rocks and the environments in which they were formed, the structure of the rocks and the interpretation of their structural history, mineral resources, and appreciation of the California landscape.—II. (II.) Osleger

25. Geology of National Parks (2)
Lecture—2 hours. Appreciation of the geologic framework underlying the inherent beauty of U.S. National Parks. Each park provides a visual focus for understanding a variety of geologic processes such as mountain building, volcanism, stream erosion, and glacial action.—I. (I.) Osleger

28. Astrobiology (3)
Lecture—3 hours. Origin, evolution and distribution of life in our solar system and the Universe. Detecting habitable worlds, Drake equations, necessities and raw materials for life, philosophical implications of the search for life elsewhere. GE Credit: SciEng.—I. (I.) Yin

30. Fractals, Chaos and Complexity (3)
Lecture/discussion—3 hours. Prerequisite: Mathematics 16A or 21A. Modern ideas about the unifying ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. Offered in alternate years. (Same course as Physics 30.) GE Credit: SciEng.—(II.) Rundle

32. Volcanoes (3)
Lecture—3 hours. Role of eruptions, and eruptive products of volcanoes in shaping the planet's surface, influencing its environment, and providing essential human resources. GE: SciEng.—III. (III.) Cooper

35. Rivers (3)
Lecture—3 hours. Introduction to geomorphology, climate and geology of rivers and watersheds, with case examples from California. Assessment of impacts of logging, agriculture, mining, urbanization and water supply on river processes. Optional river field trips. GE credit: SciEng.—Mount

36. The Solar System (4)
Lecture—3 hours; discussion—1 hour. Nature of the sun, moon, and planets as determined by recent manned and unmanned exploration of the solar system. Comparison of terrestrial, lunar, and planetary geological processes. Search for life on other planets. Origin and evolution of the solar system. (Former course 113-113G.) GE credit: SciEng, Wrt.—III. (III.) Osleger

50. Physical Geology (3)
Lecture—3 hours. Prerequisite: high school physics and chemistry. The Earth, its materials, its internal and external processes, its development through time by sea-floor spreading and global plate tectonics. Students with credit for course 1 or the equivalent may receive only 2 units for course 50.—I. II. (I, II.) Billen, Zierenberg

50L. Physical Geology Laboratory (2)
Laboratory—6 hours; one or two one-day field trips. Prerequisite: course 50 (preferably taken concurrently). Introduction to classification and recognition of minerals and rocks and to interpretation of topographic and geologic maps and aerial photographs. Students with credit for course 1L or the equivalent may receive only 1 unit for course 50L.—I. II. (I, II.) Billen, Zierenberg

60. Earth Materials: Introduction (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 2A; Mathematics 16A or 21A; course 1 or 50, 50L. Physical and chemical properties of rocks, minerals and other earth materials; structure and composition of rock-forming minerals; formation of minerals by precipitation from silicate liquids and aqueous fluids and by solid state transformations.—I. (I.) Rustad

62. Optical Mineralogy (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 60 (may be taken concurrently); high school physics is strongly recommended. Optical properties of inorganic crystals; techniques of mineral identification using the polarizing microscope; strategies for studying rocks in thin section.—I. (I.) Day, Rustad

81. Learning in Science and Mathematics (2)
Lecture/discussion—2 hours; field work—2 hours. Exploration of how students learn and develop understanding in science and mathematics classrooms. Introduction to case studies and interview techniques and their use in K-6 classrooms to illuminate factors that affect student learning. Limited enrollment. (Same course as Education 81.) (P/NP grading only.)—I, II, III. (I, II, III.)

91. Geology of Campus Waterways (1)
Lecture/discussion—1 hour; fieldwork—1 hour. Research characterizing geological processes in waterways on campus including links among hydrologic, atmospheric, physical, and human processes; carbon cycling and interpreting processes from sediments; field research techniques; research project design and implementation; implications of results for society and environmental policy. May be repeated for credit three times. (P/NP grading only.)—I, II, III. (I, II, III.) Sumner

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor; lower division standing. Work-learn experience on and off campus in all subject areas offered by the department. Internships supervised by a member of the faculty. May be repeated for credit up to 12 units. (P/NP grading only.)—I, II, III. (I, II, III.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. May be repeated for credit. May be repeated for credit up to three times. (P/NP grading only.)—I, II, III. (I, II, III.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

Upper Division Courses

100. Earth Dynamics I: Extensional and Translational Processes (3)
Lecture—3 hours. Prerequisite: course 50, 50L, Physics 7A or 9A (may be taken concurrently), or consent of instructor. Structural features of, and geophysical constraints on, regions of extensional and translational tectonics. Observation, formation, and tectonic environments of joints, fractures, normal faults, and strike-slip faults. GE credit: SciEng, Wrt.—I. (I.) Oskin

100L. Earth Dynamics I: Structure/Tectonics Laboratory (1)
Laboratory—3 hours; two one-day field trips required. Prerequisite: course 50L and course 100 (may be taken concurrently); or consent of instructor. Introduction to three-dimensional analysis of geologic structures; introduction to field techniques; interpretation of topographic and geologic maps; tectonic analysis of extensional and strike-slip terranes.—I. (I.) Oskin

101. Earth Dynamics II: Convergent and Collisional Processes (3)
Lecture—3 hours. Prerequisite: courses 50-50L, 100, Mathematics 21B or 16B (may be taken concurrently), Physics 5A or 7A or 9A (may be taken concurrently); or consent of instructor. Geophysical and structural signatures of convergent tectonics, subduction zones, plate collisions and mountain belts. Topics include ductile deformation, folds, seismic Benioff zones, gravity and isostacy. Examples of collisions and resulting mountain belts. Examples drawn from western North America. GE credit: SciEng, Wrt.—II. (II.) Cowgill

101L. Earth Dynamics II: Structure/Tectonics Laboratory (2)
Laboratory and fieldwork—6 hours; six days of field trips on four separate weekends required. Prerequisite: courses 50L, 100L, and 101 (may be taken concurrently); or consent of instructor. Continuation of Geology 100L. Analysis of three-dimensional geologic structures; introduction to field techniques; field-mapping projects; interpretation of topographic and geologic maps; tectonic analysis of convergent and collisional terranes.—II. (II.) Cowgill

103. Field Geology (3)
Fieldwork and laboratory—9 hours; 7-8 days on weekends during quarter. Prerequisite: course 101L or consent of instructor. Field mapping projects and writing geological reports. Weekly classroom meetings devoted to preparation of maps, cross sections, stratigraphic sections, rock descriptions, and reports.—III. (III.) Cowgill

105. Earth Materials: Igneous Rocks (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 60, 62; Mathematics 16A or 21A; Chemistry 2B (may be taken concurrently). Origin and occurrence of igneous rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SciEng, Wrt.—II. (II.) Cooper, Lesher

106. Earth Materials: Metamorphic Rocks (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 105, Chemistry 2B, Mathematics 16A or 21A. Physical and chemical properties of metamorphic rocks; interpretation of metamorphic environments. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section. GE credit: SciEng, Wrt.—III. (III.) Day

107. Earth History: Paleobiology (3)
Lecture—3 hours. Prerequisite: courses 3-3L or Biological Sciences 1B. The evolution and ecological structure of the biosphere from the origin of life to the present.—I, III. (I, III.) Carlson, Motani

107L. Earth History: Paleobiology Laboratory (2)
Laboratory—6 hours. Prerequisite: courses 3-3L or Biological Sciences 1B; course 107 (may be taken concurrently). Exercises in determining the ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory.—III. (III.) Carlson, Motani

108. Earth History: Paleoclimates (3)
Lecture—3 hours. Prerequisite: course 1 or Geology/Environmental Science and Policy 116; and Chemistry 2A; or consent of instructor. Geological and environmental factors controlling climate change, the greenhouse effect with a detailed analysis of the history of Earth's climate fluctuations over the last 600 million years. Past and present climate records are used to examine potential future climatic scenarios. GE credit: SciEng, Wrt.—III. (III.) Montañez, Spero

109. Earth History: Sediments and Strata (2)
Lecture—2 hours. Prerequisite: courses 50-50L. Principles of stratigraphic and sedimentologic analysis. Evaluation of historical and modern global changes in sedimentation within terrestrial and marine environments. Examination of the plate tectonic, climatic and oceanographic factors controlling the distribution and exploitation of economic fluids within sedimentary rocks. GE credit with concurrent enrollment in course 109L: SciEng.—II. (II.) Sumner

109L. Earth History: Sediments and Strata Laboratory (2)
Laboratory—6 hours (includes four 1-day field trips). Prerequisite: course 109 (may be taken concurrently). Methods of stratigraphic and sedimentologic analysis of modern and ancient sediments. Identification of major sediment and sedimentary rock types. Outcrop and subsurface analysis of sedimentary basins. GE credit with concurrent enrollment in course 109: Wrt.—II. (II.) Sumner

110. Summer Field Geology (8)
Fieldwork—8 hours/day, 6 days/week for six weeks. Prerequisite: courses 103, 109; course 105 recommended. Advanced application of geologic and geophysical field methods to the study of rocks. Includes development and interpretation of geologic maps and cross sections; gravity, magnetic, electrical resistivity and seismic surveys; and field analysis of plutonic and volcanic rock suites. GE credit: SciEng, Wrt.—IV. (IV.) McClain

115. Earth Science, History, and People (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; course 1. Study of interplay between the Earth and its human inhabitants through history, including consideration of acute events such as earthquakes and eruptions as well as the geology of resources, topography, and water. GE credit: SciEng or SocSci, Wrt.—III. (III.) Verosub

116N. Oceanography (3)
Lecture—2 hours; laboratory—3 hours; field work. Prerequisite: one of Geology 1, 2, 16 or 50. Advanced oceanographic topics: Chemical, physical, geological, and biological processes; research methods and data analysis; marine resources, anthropogenic impacts, and climate change; integrated earth/ocean/atmosphere systems; weekly lab and one weekend field trip. Same course as Environmental Science & Policy 116N.)—II. (II.) Hill, McClain, Spero

129. Sample Preparation and Techniques for Petrology (1)
Laboratory—3 hours. Prerequisite: courses 60-60L. Introduction to petrographic laboratory techniques for petrographers. Topics covered may include thin and polished section preparation, rock crushing/grinding, mineral separation, staining, and photomicroscopy. (P/NP grading only.)

130. Non-Renewable Natural Resources (3)
Lecture—3 hours. Prerequisite: course 1. Origin, occurrence, and distribution of non-renewable resources, including metallic, nonmetallic, and energy-producing materials. Problems of discovery, production, and management. Estimations and limitations of reserves, and their sociological, political, and economic effects. Offered in alternate years.—III. (III.) Rustad

131. Risk: Natural Hazards and Related Phenomena (3)
Lecture—3 hours. Prerequisite: upper division standing. Risk, prediction, prevention and response for earthquakes, volcanic eruptions, landslides, floods, storms, fires, impacts, global warming.—I. (I.) Turcotte

132. Introductory Inorganic Geochemistry (3)
Lecture—3 hours. Prerequisite: course 60, may be taken concurrently; Chemistry 2B. Nucleosynthesis of chemical elements, physical and chemical properties of elements, ionic substitution, elemental partition, distribution and transport among planetary materials, basic thermodynamics and phase diagrams, isotopic geochronometers, stable isotope fractionation, mixing and dilution, advection and diffusion, geochemical cycles.—II. (II.) Cooper, Yin, Zierenberg

134. Environmental Geology and Land Use Planning (3)
Lecture—3 hours. Prerequisite: one course in Geology, preferably course 50 or 1, or consent of instructor. Geologic aspects of land use and development planning. Geologic problems concerning volcanic and earthquake hazards, land stability, floods, erosion, coastal hazards, non-renewable resource extraction, waste disposal, water resources. GE credit: SciEng, Wrt.—II. (II.) Rustad

136. Ecogeomorphology of Rivers and Streams (5)
Lecture—1 hour; discussion/laboratory—2 hours; fieldwork; term paper or discussion. Prerequisite: upper division or graduate standing in any physical science, biological science, or engineering, and consent of instructor. Integrative multidisciplinary field analysis of streams. Class project examines hydrology, geomorphology, water quality and aquatic and riparian ecology of degraded and pristine stream systems. Includes cooperative two-week field survey in remote wilderness settings with students from diverse scientific backgrounds. Restricted to advanced students in the physical sciences, biological sciences, or engineering.—III. (III.) Mount, Moyle

138. Introductory Volcanology (4)
Lecture—2 hours; fieldwork—6 hours. Prerequisite: upper division standing, course 60 and 109 or the equivalents, or consent of instructor. Principles of physical and chemical volcanology. Taught in a volcanically active setting (e.g., Hawaii) with a strong field component. GE credit: SciEng.—II. (II.) Zierenberg

139. Rivers: Form, Function and Management (4)
Lecture—3 hours; fieldwork—3 hours. Prerequisite: courses 50, 50L, or equivalent; Mathematics 16B or 21B recommended. Analysis of river form and processes, emphasis on fluvial geomorphology, and river and stream restoration; case studies to illustrate concepts and applications. Two weekend field trips required.—III. Mount

140. Introduction to Process Geomorphology (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1 or 50 or equivalent; Mathematics 16B or 21B, or equivalent; or consent of instructor. Quantitative description and interpretation of landscapes with emphasis on the relationships between physical processes, mass conservation, and landform evolution. Topics covered include physical and chemical weathering, hillslopes, debris flows, fluvial systems, alluvial fans, pedogenesis, eolian transport, glaciation and Quaternary geochronology. Offered in alternate years.—(III.) Oskin

141. Evolutionary History of Vertebrates (3)
Lecture—3 hours. Evolutionary history of vertebrates; fossil record and phylogeny; timing of major evolutionary events; appearance of major vertebrate groups; physical constraints in vertebrate evolution; paleobiogeography of vertebrates; effect of continental movement on vertebrate evolution; dinosaurs and other strange vertebrates. Offered in alternate years.—(II.) Motani

141L. Evolutionary History of Vertebrates Laboratory (1)
Laboratory—3 hours. Prerequisite: course 141 (may be taken concurrently). Augments lecture course 141 through handling of specimens enabling in-person examination of three dimensional features observed in vertebrate skeletons, both fossil and living. Offered in alternate years.—(II.) Motani

142. Basin Analysis (3)
Laboratory—3 hours; lecture—2 hours. Prerequisite: courses 50, 50L, and 109. Analysis of sedimentary basins from initiation to maturity, including controls on sedimentary fill, subsidence analysis, sequence stratigraphy, core logs, and applications to petroleum exploration and hydrology. One two-day field trip. Offered in alternate years.—(I.) Sumner

143. Advanced Igneous Petrology (5)
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 105, Mathematics 16C or 21C, Chemistry 2C. Physical and chemical properties of magmatic environments and processes of igneous rock formation. Laboratory study of representative igneous rocks. GE credit: SciEng, Wrt.—Cooper, Lesher

144. Historical Ecology (3)
Lecture—3 hours. Prerequisite: upper division course in environmental science or ecology, or an introductory course in paleobiology. Ancient ecosystems and the factors that caused them to change. Species, expansion, evolution of new modes of life, geologically induced variations in resource supply, and extinction provide historical perspective on the biosphere of future.—II. Vermeij

145. Advanced Metamorphic Petrology (5)
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 106; Hydrologic Science 134 or Chemistry 2C; Mathematics 16C or 21C. Metamorphic processes and the origin of metamorphic rocks. Laboratory study of representative rock suites. Offered in alternate years. GE credit: SciEng, Wrt.—(II.) Day

146. Radiogenic Isotope Geochemistry and Cosmochemistry (3)
Lecture—3 hours. Prerequisite: Chemistry 2C, Physics 7C, and Mathematics 16C. Basic principles of nuclear chemistry and physics applied to geology to determine the ages of terrestrial rocks, meteorites, archeological objects, age of the Earth, to trace geological/environmental processes, and explain formation of the chemical elements in the Universe. Offered in alternate years.—I. (I.) Day, Yin

147. Geology of Ore Deposits (4)
Lecture—3 hours; laboratory—3 hours; optional one-weekend field trip. Prerequisite: Chemistry 2C or Hydrologic Science 134, courses 60, 62, and 105. Tectonic, lithologic and geochemical setting of major metallic ore deposit types emphasizing ore deposit genesis, water/rock interaction and the environmental effects of mining. Offered in alternate years.—(III.) Zierenberg

148. Stable Isotopes and Geochemical Tracers (3)
Lecture—3 hours. Prerequisite: Chemistry 2C or Hydrologic Science 134; courses 50, 50L, 60. Use of oxygen and hydrogen isotopes in defining hydrologic processes; carbon, nitrogen, and sulfur isotopes as indicators of exchange between the lithosphere, hydrosphere, atmosphere and biosphere. Radiogenic, cosmogenic, and noble gas isotope tracers. Offered in alternate years.—III. Zierenberg

150A. Physical and Chemical Oceanography (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 116/Environmental Science and Policy 116; Physics 9B; Mathematics 21D; Chemistry 2C; or upper division standing in a natural science and consent of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. (Same course as Environmental Science and Policy 150A.)—I. (I.) McClain, Spero

150B. Geological Oceanography (3)
Lecture—3 hours. Prerequisite: course 50 or 116. Introduction to the origin and geologic evolution of ocean basins. Composition and structure of oceanic crust; marine volcanism; and deposition of marine sediments. Interpretation of geologic history of the ocean floor in terms of sea-floor spreading theory. (Same course as Environmental Science and Policy 150B.)—II. (II.) McClain

150C. Biological Oceanography (4)
Lecture—3 hours; discussion—1 hour; fieldwork—one weekend field trip required. Prerequisite: Biological Sciences 1A and a course in general ecology or consent of instructor. Ecology of major marine habitats, including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and con-

temporary issues in research. Segment devoted to human use. (Same course as Environmental Science and Policy 150C.)—IV. (IV.) Hill

152. Paleobiology of Protista (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 107 or Biological Sciences 1A or consent of instructor. Morphology, systematics, evolution, and ecology of single-celled organisms that are preserved in the fossil record. Offered in alternate years.—Hill

156. Hydrogeology and Contaminant Transport (5)
Lecture—3 hours; laboratory—3 hours; term paper. Prerequisite: Hydrologic Science 145, Civil and Environmental Engineering 144 or the equivalent. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic systems. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (Same course as Hydrologic Science 146.)—II. (II.) Fogg

160. Geological Data Analysis (3)
Lecture/discussion—3 hours. Prerequisite: Mathematics 21A or the equivalent. Introduction to quantitative methods in analyzing geological data including basic principles of statistics and probability, error analysis, hypothesis testing, inverse theory, time series analysis and directional data analyses. Use of computer in lectures and homework.—(II.) Rundle

161. Geophysical Field Methods (3)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 50, Mathematics 21C, Physics 7C or 9C, or consent of instructor. Geophysical methods applied to determining subsurface structure in tectonics, hydrogeology, geotechnical engineering, hydrocarbon and mineral exploration. Theory, survey design and interpretation of gravity, electrical resistivity, electromagnetic, reflection and refraction seismology, and ground-penetrating radar measurements.—I. Billen

162. Geophysics of the Solid Earth (3)
Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 5C or 7C or 9C; or consent of instructor. Theory and use of physics in the study of the solid earth. Gravity, magnetism, paleomagnetism, and heat flow. Application to the interpretation of the regional and large-scale structure of the earth and to plate tectonics. Offered in alternate years.—II. Kellogg

163. Planetary Geology and Geophysics (3)
Lecture—3 hours. Prerequisite: Mathematics 21C, Physics 7C or 9C, and course 50 or 36 or Astronomy 10, or consent of instructor. Principles of planetary science. Planetary dynamics, including orbital mechanics, tidal interactions and ring dynamics. Theory of planetary interiors, gravitational fields, rotational dynamics. Physics of planetary atmospheres. Geological processes, landforms and their modification. Methods of analysis from Earth-based observations and spacecraft.—III. (III.) Kellogg, Yin

175. Advanced Field Geology (3)
Discussion—3 hours; fieldwork—6 hours. Prerequisite: consent of instructor. Advanced field studies of selected geologic terrains, interpretation and discussion of field observations. May be repeated two times for credit when instructors varies. (P/NP grading only.)—I. (I.) Cooper, Roeske

181. Teaching in Science and Mathematics (2)
Lecture/discussion—2 hours; field work—2 hours. Prerequisite: Geology 81/Education 81, previous experience in a K-12 classroom, or consent of instructor. Exploration of effective teaching practices based on examination of how middle school students learn math and science. Selected readings, discussion and field experience in middle school classrooms. (Same course as Education 181.) (P/NP grading only.)—I, II, III. (I, II, III.) Horn

182. Field Studies in Marine Geochemistry (2-8)
Lecture—3 hours; laboratory—1-3 hours; fieldwork—6-40 hours. Prerequisite: consent of instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of seafloor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected.—Hill

183. Teaching High School Mathematics and Science (3)
Lecture/discussion—2 hours; field work—3 hours. Prerequisite: course 81/Education 81 or course 181/Education 181 or consent of instructor. Exploration and creation of effective teaching practices based on examination of how high school students learn mathematics and science. Field experience in high school classrooms. Limited enrollment. (Same course as Education 183.)—I, II, III. (I, II, III.) Stevenson

190. Seminar in Geology (1)
Discussion—1 hour; seminar—1 hour; written abstracts. Prerequisite: major in Geology. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship in Geology (1-12)
Internship. Prerequisite: upper division standing; project approval prior to internship. Supervised work experience in geology. May be repeated for credit for a total of 10 units. (P/NP grading only.)

194A-194B. Senior Thesis (3-3)
Prerequisite: open to Geology majors who have completed 135 units and who do not qualify for the honors program. Guided independent study of a selected topic, leading to the writing of a senior thesis. (Deferred grading only, pending completion of course sequence.)

194HA-194HB. Senior Honors Project (3-3)
Independent study—9 hours. Prerequisite: open to Geology majors who have completed 135 units and who qualify for the honors program. Guided independent study of a selected topic, leading to the writing of an honors thesis. (Deferred grading only, pending completion of sequence.)

198. Directed Group Study (1-5)
Prerequisite: senior standing in Geology or consent of instructor.

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

205. Advanced Field Stratigraphy (3)
Lecture—1 hour; field work—2 hours. Prerequisite: courses 109 and 110 or consent of instructor; course 206 recommended. Fieldwork over spring break. Application of stratigraphic techniques to research problems. Collection, compilation, and interpretation of field data. Integration of data with models for deposition and interpretations of Earth history. Topics will vary. May be repeated for credit.—III. (III.)

206. Stratigraphic Analysis (3)
Lecture—3 hours. Prerequisite: courses 109, 109L or consent of instructor; course 144 recommended. Topics in advanced methods of stratigraphic analysis, regional stratigraphy and sedimentation, and sedimentary basin analysis. Emphasis on techniques used to interpret stratigraphic record and on current issues in stratigraphy and sedimentation. May be repeated for credit when topic differs.—II. (II.) Montañez

214. Active Tectonics (3)
Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Active deformation associated with faults, landslides, and volcanoes. Geodetic measurement techniques such as triangulation, trilateration, leveling, Global Positioning System (GPS), and radar interferometry. GPS data acquisition and analysis. Inversion of geodetic data and mechanical models of crustal deformation.—III. (III.) Oskin

216. Tectonics (3)
Lecture/discussion—3 hours. Prerequisite: course 101 or consent of instructor. Nature and evolution of tectonic features of the Earth. Causes, consequences, and evolution of plate motion, with selected examples from the Earth's deformed belts. Offered in alternate years.—I. Cowgill

217. Topics in Geophysics (3)
Lecture—1 hour; seminar—2 hours. Prerequisite: consent of instructor. Discussion and evaluation of current research in a given area of geophysics. Topic will change from year to year. May be repeated for credit.—(I.) I. Billen, Kellogg

218. Analysis of Structures in Deformed Rocks (3)
Seminar—3 hours. Prerequisite: courses 100, 100L, 101, 101L, 170; or consent of instructor. Recent advances in the understanding and analysis of structures in brittlely and ductilely deformed rocks. Detailed investigation of the characteristics of the structures, models for their formation, and applications to inferring the kinematics of larger scale tectonics. Offered in alternate years.—(I.) Cowgill

219. Fracture and Flow of Rocks (3)
Lecture—3 hours. Prerequisite: courses 100, 101, Mathematics 21 or 16, Physics 7 or 9, or consent of instructor. Origins of those structures in rocks associated with brittle and ductile deformation. Theoretical analysis, using continuum mechanics, and experimental evidence for the origin of the structures with emphasis on deformational processes in the earth. Offered in alternate years.—III. (III.) Billen

220. Mechanics of Geologic Structures (3)
Lecture—3 hours. Prerequisite: course 170, Mathematics 21C, Physics 9A or 5A, or consent of instructor; Mathematics 21D and 22A recommended. Development in tensor notation of the balance laws of continuum mechanics, and constitutive theories of elasticity, viscosity, and plasticity and their application to understanding development of geologic structures such as fractures, faults, dikes, folds, foliations, and boudinage. Offered in alternate years.

226. Advanced Sedimentary Petrology (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 144 or consent of instructor. Advanced petrography and geochemistry of sediments and sedimentary rocks. Geochemical, textural and mineralogical evolution of sedimentary rocks reflecting depositional or burial processes. Laboratory work emphasizes thin section study of rocks. May be repeated for credit when topic differs.—Sumner

227. Stable Isotope Biogeochemistry (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: graduate standing and consent of instructor. Discussion and application of stable isotope techniques for scientific research problems. Course emphasizes carbon, oxygen, nitrogen, hydrogen and sulfur isotopes. Laboratory will develop basic skills of cryogenic gas extraction and specific techniques for individual research using stable isotopes.—II. Spero

228. Topics in Paleoceanography (3)
Lecture—3 hours. Prerequisite: courses 108, 150A or consent of instructor. Critical discussion and review of selected topics in paleoceanography and paleoclimatology relating to the history of the processes controlling and affecting climate change and ocean circulation throughout the geologic record. Topics vary. May be repeated for credit.—(II.) Hill, Spero

230. Geomorphology and River Management (3)
Seminar—3 hours. Prerequisite: graduate standing, course 139 or equivalent. Impacts of management and land use activities on the geomorphology of rivers and streams. Evaluation and use of analytical tools for river assessment. Assessment of river and stream restoration strategies and emerging issues in river management. May be repeated for credit when topic differs.—I. (I.) Mount

232. The Oceans and Climate Change (3)
Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Modern climate change and linkages between the ocean-atmospherecryosphere-terrestrial climate system. Importance of the ocean in forcing climate change, and the impacts of anthropogenic processes on the ocean. Topics vary. May be repeated three times for credit. Offered in alternate years.—(II.) Hill

235. Surface Processes (3)
Seminar—3 hours. Prerequisite: courses 50, 50L, 139; Mathematics 21B or 16B recommended. Recent advances in the analysis of landforms and their evolution. Detailed investigation of the tools used to document surface processes. Evaluation of concepts and processes that govern landscape evolution. May be repeated for credit when topic differs.—III. Oskin

236. Inverse Theory in Geology and Geophysics (3)
Lecture—3 hours. Prerequisite: consent of instructor. Inversion of data for model parameters. Evaluation of parameter uncertainties. Linear and nonlinear problems for discrete and continuous models. Bakus-Gilbert inversion. Offered in alternate years.—McClain

238. Theoretical Seismology (3)
Lecture—3 hours. Prerequisite: consent of instructor. Elastodynamic wave equation. Greens functions and source representations. Ray theory. Plane and spherical waves and boundary conditions. Elastic wave propagation in stratified media. Offered in alternate years. (P/NP grading only.)—McClain

240. Geophysics of the Earth (3)
Lecture—3 hours. Prerequisite: Earth Sciences and Resources 201, Physics 9B, Mathematics 22B. Physics of the earth's crust, mantle, and core. Laplace's equation and spherical harmonic expression of gravity and magnetic fields. Elastic wave equation in geologic media. Body and surface seismic waves. Equations of state, thermal structure of the earth. Offered in alternate years.—(III.) Turcotte

241. Geomagnetism (3)
Lecture—3 hours. Prerequisite: graduate standing. Nature and origin of the Earth's magnetic field. Present field and recent secular variation. Spherical harmonic analysis. Paleosecular variation. Polarity transitions and geomagnetic excursions. Statistics of polarity intervals. Dynamo theory. Planetary magnetism. Offered in alternate years.—Verosub

242. Paleomagnetism (3)
Lecture—3 hours. Prerequisite: graduate standing. Principles and applications of paleomagnetism. Physical basis of rock and mineral magnetism. Field and laboratory techniques. Instrumentation. Analysis of paleomagnetic data. Statistical methods. Rock magnetic properties. Geological and geophysical applications. Offered in alternate years.—Verosub

246. Physical Chemistry of Metamorphic Processes (3)
Lecture—3 hours. Prerequisite: course 145, Chemistry 110A, or consent of instructor. Physiochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered in alternate years.—(II.) Day

247. Metamorphic Petrology Seminar (3)
Seminar—3 hours. Prerequisite: course 145 or consent of instructor; course 246 recommended. Selected topics in metamorphic petrology (e.g., mass transport processes, tectonic settings, geothermometry, thermal structure of metamorphic belts, regional studies). May be repeated for credit when topic differs. Offered in alternate years. (S/U grading only.)—Day

250. Advanced Geochemistry Seminar (3)
Seminar—3 hours. Prerequisite: course 146 or consent of instructor. Critical review of selected topics in geochemistry including: ore genesis, hydrothermal and geothermal fluids, recent and ancient sediments, isotope geology, origin and chemistry of the oceans. Subject varies yearly depending on student interest. May be repeated for credit. Offered in alternate years.—Zierenberg

251. Advanced Topics in Isotope Geochemistry and Cosmochemistry (3)
Lecture/discussion—2 hours; term paper. Prerequisite: graduate standing or consent of instructor. Astrophysical context on origin of Solar System, synthesis of chemical elements, condensation sequence, star and planet formation, cosmochronology, building blocks of planets, development on planets' layered structure, atmosphere and hydrosphere and the role of comets/asteroids for volatile delivery. May be repeated three times for credit when topics differs. Offered in alternate years.—(II.) Yin

253. Current Topics in Igneous Petrology (3)
Seminar—3 hours. Prerequisite: graduate standing in Geology; course 143 or consent of instructor. Topical seminar designed to help graduate students develop and maintain familiarity with current and past literature related to igneous rock petrogenesis. May be repeated for credit when topic differs. (S/U grading only.)—II. Lesher, Cooper

254. Physical Chemistry of Igneous Processes (3)
Lecture—3 hours. Prerequisite: course 143 or consent of instructor; Chemistry 110A required; Chemistry 110B and 110C recommended. Introduction of modern concepts in chemical thermodynamics and kinetics, and fluid dynamics of magmatic systems for graduate students in petrology. Offered in alternate years.—Lesher

255. Experimental Petrology (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 143 or consent of instructor. Introduction to techniques and methods of design and executing experiments on Earth-forming minerals and rocks. Problems and examples from igneous and metamorphic petrology will be utilized. Offered in alternate years.—Lesher

260. Paleontology (3)
Seminar—3 hours. Prerequisite: graduate standing in geology or a biological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting. May be repeated for credit when topic differs.—III. (IIII.) Vermeij

261. Paleobiology Graduate Seminar 1: Evolutionary aspects (3)
Lecture—1 hour; seminar—2 hours. Prerequisite: graduate standing in Geology or a biological science; qualified undergraduates accepted on an exception-only basis. This course will treat one or more of several topics in paleobiology from a phylogenetic perspective, including major patterns in evolution, building the tree of life, extinction and phylogeny, phylogeny of major phyla, and the relation between taxonomy and phylogeny. May be repeated for credit when topic varies.—(I.) Carlson

262. Paleobiology Graduate Seminar: Methodological Aspects (3)
Lecture—1 hour; seminar—2 hours. One or more major methods used in the study of fossils: Morphometrics and three-dimensional reconstruction of fossils, phylogenetic methodology, the application of geochemical techniques, and electron microscopy. May be repeated four times for credit if topic varies.—II. Motani

281. Instrumental Techniques for Earth Scientists (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 21A, 21B, 21C, Physics 7A, 7B, 7C or 9A, 9B, 9C or consent of instructor. Laboratory research techniques for new graduate students in Geology. Demonstration of and exposure to appropriate techniques in research.—Yin

285. Field Studies in Marine Geochemistry (2-8)
Lecture—3 hours; laboratory—1-3 hours; fieldwork—6-40 hours. Prerequisite: consent of instructor. Marine geochemistry with the opportunity of going to sea or into the field on land. Techniques of seafloor mapping using bottom photography, marine geochemical sampling, and method of data reduction and sample analysis. Analysis of data/samples collected.—Hill

290. Seminar in Geology (1)
Seminar—1 hour; discussion—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (S/U grading only.)—I, II, III. (I, II, III.)

291. Geology of the Sierra Nevada (1)
Seminar—one day-long session. Prerequisite: consent of instructor. Short oral presentations by students and faculty concerning results of their past work and plans for future work in the Sierra. A written abstract is required following the format required at professional meetings. (S/U grading only.)—Day

292. River Forum (1)
Seminar—1 hour; optional field trips to evaluate local rivers. Prerequisite: graduate standing. Review and discussion of latest research and fundamental issues surrounding riverine systems, with emphasis on physical processes. Topics vary. (S/U grading only.)—I, II, III. (I, II, III.) Mount

293. Geologic Event of the Week (1)
Discussion—0.5 hours; seminar—0.5 hours. Prerequisite: graduate standing. Seminar/discussion group to review and discuss recent earthquakes, volcanic eruptions, and other significant geologic events. The focus is on understanding the available observations, the physical processes behind each event, the geological setting, and societal consequences. May be repeated for credit three times for up to three units. (S/U grading only.)—Kellogg

294. Structure/Tectonics Forum (1)
Seminar—1 hour. Prerequisite: graduate student in geology or consent of instructor. Seminar/discussion group to review and discuss latest research in structural geology and tectonics, and on-going research of participants. Topics will vary each quarter depending on the interests of the group. Occasional field trips to areas of current interest. May be repeated for credit when topic differs. (S/U grading only.)—I, II, III. (I, II, III.) Roeske

295. Advanced Problems in Geodynamics (3)
Seminar—3 hours. Prerequisite: courses 100 and 101 or consent of instructor. Seminar dealing with problems in geodynamics. Topics will vary (e.g., ductile deformation mechanisms, brittle fracture, earthquake prediction, driving forces for plate tectonics, mantle convection). Emphasis on recent literature. May be repeated for credit when topic differs. Offered in alternate years. (S/U grading only.)

296. Advanced Problems in Tectonics (3)
Seminar—3 hours. Prerequisite: course 101 or consent of instructor. Seminar dealing with current problems in tectonics of selected regions. Topics will change from year to year. Emphasis on study of recent literature. May be repeated for credit. Offered in alternate years. (S/U grading only.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Professional Courses

390. Methods of Teaching Geology (1)
Discussion—1 hour. Prerequisite: graduate student standing in Geology. Discussion of methods and problems of teaching geology. Topics include departmental facilities, grading efficiency/effectiveness, Teaching Assistant/student interaction, and teaching techniques for lecturing, discussions, and labs. Participation in teaching program required for Ph.D. in Geology. (S/U grading only.)—(I.) Carlson

391. Ethical Issues in Earth Sciences (1)
Seminar—1 hour. Prerequisite: graduate standing in Geology or consent of instructor. Reading and discussion of ethical issues arising in the earth sciences. Topics include scientific misconduct, gender equity in science, authorship of scientific papers, establishing priorities in research, and related issues. Offered in alternate years. (S/U grading only.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Geophysics

(College of Letters and Science)

Geophysics is the study of the physical properties and processes within and surrounding the Earth. Many problems in the Earth Sciences require geophysical techniques for study. The interdisciplinary minor in geophysics is for students with backgrounds in the physical sciences, engineering and other fields who are interested in pursuing a graduate or professional career in geophysics, or those who desire a career in the energy, minerals, or environmental industries. The minor is sponsored by the Department of Geology in 2119 Earth and Physical Sciences Building.

Minor Program Requirements:

UNITS

Geophysics 21-24

Engineering 5 3
Geology 161, 162 6
Engineering: Applied Science 115 3
One course sequence chosen from the following: 9-12
(a) Atmospheric Science 120, 121A, 121B;
(b) Geology 100, 100L, 101, 101L;
(c) Mathematics 118A, 118B, 118C;
(d) Physics 104A, 104B, 105C.

Minor Adviser. Magali Billen, Department of Geology in 2129 Earth and Physical Sciences Building (530) 754-5696

German

(College of Letters and Science)

Gail Finney, Ph.D., Chairperson of the Department

Department Office. German and Russian
209 Sproul Hall (530) 752-4999;
http://german.ucdavis.edu

Faculty

Carlee Arnett, Ph.D., Associate Professor
Clifford A. Bernd, Dr.Phil., Professor
Jaimey Fisher, Ph.D., Associate Professor
Gail Finney, Ph.D., Professor
Distinguished Teaching Award-Graduate/ Professional
Elisabeth Krimmer, Ph.D., Associate Professor
Winder McConnell, Ph.D., Professor
Gerhard Richter, Ph.D., Professor

Emeriti Faculty

John F. Fetzer, Ph.D., Professor Emeritus
Ingeborg Henderson, Ph.D., Senior Lecturer Emerita
Academic Senate Distinguished Teaching Award
Karl R. Menges, Dr.Phil., Professor Emeritus
H. Guenther Nerjes, Ph.D., Associate Professor Emeritus
Fritz Sammern-Frankenegg, Dr.Phil., Lecturer Emeritus

The Major Program

The German major explores in depth the literature and language, the culture and commerce of the German-speaking world. Whereas the General Program accommodates specifically those students whose interest lies in literary studies, German Area Studies as well as the Culture and Commerce emphasis are two options that combine advanced language study with courses featuring the contributions of the German-speaking world to fields such as music, art, philosophy, history, and economics.

The Program. Two of the three major emphases reflect the department's primary emphasis on literary figures, movements and themes, and thus they share a common core of upper-division literature electives. The Culture and Commerce emphasis has as its goal functional language competency to enable students to live and work in a German-speaking environment. A key feature of this track is a work/study experience abroad. Regardless of emphasis, students will find maximum practice in spoken and written German as well as in listening comprehension in all upper-division courses offered in German.

Career Alternatives. Completion of the major prepares students for graduate study in German or for career opportunities in international fields ranging from employment in business and government to careers in the fine arts and sciences. Also, it permits admission to professional schools such as law and medicine.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 0-27

German 1-2-3 (or the equivalent) 0-15
German 20, 21, 22 0-12

Depth Subject Matter 44

General Program

German 101A, 101B, 103 12
German 120 or 118E 4
Four courses chosen from upper-division offerings taught in German 16
Three additional upper division courses selected from either 104-109 or 121-198 12
Or courses in other disciplines that focus on German history, thought, and culture, upon approval of the major advisor. Electives include, but are not limited to:
Art History 176C, 177A, 177B
Comparative Literature 138, 140-142, 147
Economics 110B, 116, 160A and 160B, 162
Film Studies 142, 176A, 176B
History 142A, and 142B, 144A and 144B
Music 110A, 110C, 110D, 110E
Philosophy 170, 175
Political Science 117, 118C, 137
Note: Many of the above electives from other disciplines have prerequisites.
The total of 44 upper-division units may include units earned in the Education Abroad Program.

Total Units for the Major 44

Minor Program Requirements:

The Department offers a German minor consisting of at least 20 upper-division units of courses taught in German Students wishing to minor in German should consult the undergraduate advisor.

UNITS

German 20

Major Adviser. E. Krimmer

Honors and Honors Program. The honors program consists of two quarters of research (194H) terminating in an honors thesis. For details consult the undergraduate major advisor. Graduation with high or highest honors requires participation in the honors program.

Graduate Study. The Department offers programs of study and research leading to the M.A. degree and to the Ph.D. degree in German Literature. Additional degree options for a designated emphasis are available through departmental affiliations with the programs in Social Theory and Comparative History, Critical Theory, Feminist Theory, and Second Language Acquisition. Detailed information may be obtained by writing to the Department Chairperson or the Graduate Adviser.

Graduate Adviser. J. Fisher

Prerequisite Credit. Credit normally will not be given on the lower-division level for a course that is the prerequisite of a course already successfully completed.

Courses in German (GER)

Lower Division Courses

Course Placement: Students with two years of high school German normally continue in German 2; those with three years, German 3; those with four years, German 20.

1. Elementary German (5)
Discussion—5 hours; laboratory—1 hour. Introduction to German grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed German 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed. Not open to students who have taken course 1A.—I, II, III. (I, II, III.) Arnett

1A. Accelerated Intensive Elementary German (15)
Lecture/discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to German grammar and development of all language skills in a cultural context with emphasis on communication. Not open to students who have completed courses 1, 2, or 3.—IV. (IV.) Arnett

2. Elementary German (5)
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in areas of grammar and basic language skills. Not open for credit to students who have taken course 1A.—I, II. (I, II.) Arnett

3. Elementary German (5)
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts. Not open to students who have taken course 1A.—I, II. (I, II.) Arnett

6. Conversational German (4)
Discussion—3 hours; term paper. Prerequisite: course 3. Course 6 may be taken concurrently with course 20. Designed to develop intermediate language skills with special emphasis on communication and grammatical accuracy.—II.

20. Intermediate German (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3; may be taken concurrently with course 6. Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts.—I, II. (I, II.)

21. Intermediate German (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 20. Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts.—I, II. (I, II.)

22. Intermediate German (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 21. Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts.—II, III. (II, III.)

40. Great German Short Stories (in English) (4)
Lecture/discussion—3 hours; extensive writing. Major German short stories from Goethe at the end of the eighteenth century to Thomas Mann at the beginning of the twentieth century. Offered in alternate years. GE Credit: ArtHum, Div, Wrt.—II.

48. Myth and Saga in the Germanic Cultures (4)
Lecture—3 hours; term paper. Knowledge of German not required. Reading in English translation from the Norse Eddas, the Volsung and Sigurd-Siegfried cycles, and the Gudrun lays; literary mythology in German Romanticism culminating in Wagner's "total art-work" concept and The Ring of the Nibelung cycle. May not be counted toward major in German. GE credit: ArtHum, Wrt.—I. (I.)

49. Freshman Colloquium (2)
Seminar—2 hours. Prerequisite: open only to students who have completed 40 or fewer quarter units of transferable college-level work. Readings, discussion and written projects treating topics such as communist–capitalist tension in German literary culture; masculine "versus" feminine authorial consciousness; disintegration and reconstitution of language reflecting cultural transformation; exorcising post-holocaust national guilt and individual frustration—Germany's new European "mission."—II. (II.)

92. Field Work in German (1-12)
Internship—3-36 hours. Prerequisite: lower division standing. Total immersion program in Germany or a German speaking setting in the U.S. to further develop students' proficiency in the German language. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

101A. Survey of German Literature, 800-1800 (4)
Lecture/discussion—3 hours. Prerequisite: course 22. German literature from the Middle Ages to Classicism (800-1800) with an overview of major movements and authors. GE credit: ArtHum—I. (I.)

101B. Survey of German Literature, 1800-Present (4)
Lecture/discussion—3 hours. Prerequisite: course 22. German literature from the Age of Romanticism (1800) to the present with an overview of major movements and authors. GE credit: ArtHum—II. (II.)

103. Writing Skills in German (4)
Lecture—3 hours; extensive writing. Prerequisite: course 22. Practice in different kinds of writing, such as abstracts, correspondence, lecture summaries, analysis of or response to short literary texts.

104. Translation (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 22. Exercises in German-to-English, English-to-German translation using texts from the areas of culture and commerce. Not open for credit to students who have completed course 104A. Offered in alternate years.

105. The Modern German Language (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 22. Introduction to the linguistic analysis of contemporary German, including its phonology, morphology, syntax and semantics, as well as sociolinguistic considerations. GE credit: ArtHum, Wrt.—I. (I.) Arnett

109A. Business German (4)
Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: course 22 or consent of instructor. Specialized language course using business-oriented information and publications as the basis for discussions, roleplay, reports, compositions and translations. Offered in alternate years.—II.

109B. Advanced Business German (4)
Lecture/discussion—3 hours; laboratory/discussion—1 hour. Prerequisite: course 22 or consent of instructor. Specialized advanced language course providing in-depth study of major business topics with the help of authentic texts and videos. Offered in alternate years.—(II.)

112. Topics in German Literature (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: upper division standing or consent of instructor. Investigation of significant themes and issues within their European context. Knowledge of German is not required. May be repeated one time for credit. Offered in alternate years. GE credit: ArtHum, Wrt.—III.

113. Goethe's Faust (4)
Discussion—3 hours; term paper. Knowledge of German not required. Intensive study of Goethe's Faust in its entirety. Discussions and readings in English; reading the text in the original is encouraged. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—II, III. Bernd

114. From Marlene Dietrich to Run, Lola Run: German Women and Film (4)
Lecture/discussion—3 hours; extensive writing. Knowledge of German not required. Women in German film from the Weimar Republic to present, with special emphasis on conceptualizations of gender, historical and political context, aesthetic and filmic innovations. GE Credit: ArtHum, Wrt.—III. (III.) Krimmer

115. German Literature Since 1945 (4)
Lecture—3 hours; extensive writing. Knowledge of German not required. Major writers of the post-war generation of Austria, Switzerland and Germany: novelists, such as Böll, Grass, Johnson, Walser, Handke; playwrights such as Frisch, Dürrentmatt and Hochhuth; and poets, such as Celan, Enzensberger, and Aichinger. May be repeated for credit in different topic area. GE credit: ArtHum, Wrt.—I. (I.)

116. Readings in Jewish Writing and Thought in German Culture (4)
Lecture—3 hours; term paper. Prerequisite: Religious Studies 23 or consent of instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German-speaking world; what it means to be "other" in the mainstream culture. No credit will be given to those students who have completed Humanities 121. May be repeated two times for credit if topic differs. Offered in alternate years. (Same course as Jewish Studies 116.) GE credit: ArtHum, Div, Wrt.—(I.)

117. After the Catastrophe: Jews and Jewish Life in Post-1945 Germany (4)
Lecture/discussion—3 hours; term paper. Examination of the place of Jews and Jewish culture in post-1945 Germany, with special attention given to literature, historical debates, photography, film, as well as websites and other new media. Offered in alternate years. GE Credit: ArtHum, Div, Wrt.—II, III. Fisher

118A. Vienna at the Turn of the Twentieth Century (The End of the Habsburg Empire) (4)
Lecture—1 hour; discussion—2 hours; extensive writing. Knowledge of German not required. Cultural ferment in Vienna, capital of the multinational Habsburg empire, at the turn of the century, with consideration of innovations in literature, music, graphic arts, architecture, philosophy and psychology, heralding European modernism. Offered in alternate years. GE credit: ArtHum, Wrt.—I. Finney

118B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism (4)
Lecture—1 hour; discussion—2 hours; extensive writing. Knowledge of German not required. Expressionism in graphic arts, literature, film, New Objectivity, Brecht and Bauhaus considered in the context of the failure of the German experiment in democracy, the Weimar Republic of 1919-33. Offered in alternate years. GE credit: ArtHum, Wrt.—III.

118C. Germany Under the Third Reich (4)
Lecture/discussion—3 hours; term paper. Prerequisite: background in modern European history; course 118B recommended. No knowledge of German required. Interdisciplinary study of German society and culture during the Third Reich (1933-45); readings in aesthetics, history, and philosophy; study of Fascist culture in literature, film, architecture, and the graphic arts; focus on everyday life in Hitler's Germany. GE credit: ArtHum, Wrt.—I. McConnell

118E. Contemporary German Culture (4)
Lecture/discussion—3 hours. Prerequisite: course 22. The political, economic, social and cultural scene of Germany today. Offered in alternate years. GE credit: ArtHum, Wrt.—II.

119. From German Fiction to German Film (4)
Lecture—3 hours; discussion—1 hour; term paper. Examines a number of film adaptations of major German prose works and plays to ascertain the types of changes involved in the shift in medium and the positive and negative effects achieved by such transferences. GE credit: ArtHum, Wrt.—II. (II.)

120. Survey of German Culture (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 22. Major developments in German arts, philosophical thought, social institutions, and political history. GE credit: ArtHum.—III. (III.) Bernd

121. The Medieval Period in German Literature (4)
Discussion—3 hours; extensive writing. Prerequisite: course 22. Literary-philosophical profile of the Mittelhochdeutsche Blütezeit in terms of the significant epics, romances, and lyric poetry. Readings in German. Offered in alternate years. GE credit: ArtHum.—II. McConnell

122. Reformation and Baroque (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 22. Exemplary literary works of the 16th and 17th centuries tracing the principal lines of development and showing the reflection in literature of the social, as well as religious, scenes. Offered in alternate years. GE credit: ArtHum.—I. Bernd

123. Literature of the Classical Age (4)
Discussion—3 hours; term paper. Prerequisite: course 22. A critical assessment of principal works of Goethe and Schiller within the historical and philosophical context of their times. Offered in alternate years. GE credit: ArtHum.—I. Bernd

124. Major Movements in German Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 22. Significant movements and schools in German literary history (e.g., the medieval troubadours, storm and stress, the romanticists, the George Circle, the expressionists), with emphasis on the broader cultural dynamics and ideologies as these apply to individual literary works. May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum.—II.

125. Short Fiction: 1880-1914 (4)
Lecture—3 hours; term paper. Prerequisite: course 22. Reading of short German fiction from the fin-de-siècle period and representative of various prose styles and cultural currents. Offered in alternate years. GE credit: ArtHum.—III.

126. Modern German Literature (4)
Discussion—3 hours; extensive writing. Prerequisite: course 22. Selections from significant works of major contemporary writers, such as Hesse, Mann, Kafka, Rilke, Brecht, Grass. May be repeated one time for credit with consent of adviser. GE credit: ArtHum.—I. (I.) Finney

127. Major Writers in German (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 22. Examination of representative works by a major writer, set in the broader cultural context of the relevant period or movement. May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum.—I, III.

129. Postwar Women Writers (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 22. Major writers in both Germanies, Austria, and Switzerland since 1945. Topics include the concept of a feminist aesthetics, East vs. West German writers, and the status of minority women writers in Germany (Jewish, Turkish-German, Afro-German). GE credit: ArtHum, Div.—I. (I.) Finney

131. German Lyric Poetry (4)
Lecture—3 hours; term paper. Prerequisite: course 22. Study of the genre of lyric poetry from the late Middle Ages through Renaissance, Baroque, Classical, Romantic, and Modern periods in correlation with other literary forms and the social climate of each period. Offered in alternate years. GE credit: ArtHum.—I.

132. The German Novelle (4)
Lecture—3 hours; term paper. Prerequisite: course 22. Inquiry into the art of the "Novelle" through analysis of the materials and formal devices of representative authors from Goethe to Kafka. Offered in alternate years. GE credit: ArtHum.—I. Bernd

133. The German Drama (4)
Lecture—3 hours; term paper. Prerequisite: course 22. Readings in the works of Germany's leading dramatists from the eighteenth century to the present day, such as Lessing, Goethe, Schiller, Kleist, Büchner, Hauptmann, Brecht. Offered in alternate years. GE credit: ArtHum.—(III.)

134. Topics in German Intellectual History (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 22. Topics in German intellectual history with materials from a number of periods, genres, and disciplines. May be repeated two times for credit when topic differs. GE credit: ArtHum.—I, III. (I, III.)

141. The Holocaust and its Literary Representation (4)
Lecture—2 hours; discussion—1 hour; term paper. Knowledge of German not required. Aesthetic representation and metaphorical transformation of the holocaust in its human and historical perspectives. Offered in alternate years. GE credit: ArtHum, Wrt.—(I.)

142. New German Cinema (4)
Lecture/discussion—3 hours; extensive writing. German filmmakers of the 1960s-1980s such as Fassbinder, Herzog, Syberberg, Brückner, Schlöndorf, Kluge, Wenders. Knowledge of German not required. May be repeated for credit with consent of instructor. (Same course as Film Studies 142) GE credit: ArtHum, Wrt.—I. (I.) Fisher

143. Language Through Media (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 22. Study of contemporary German-language news media (press, video, film, CD-ROM, Internet) for insight into political and cultural developments in the German-speaking countries. Offered in alternate years. GE credit: ArtHum.—II. (II.) Arnett

160. Love in the Middle Ages (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 22. Analysis of the phenomenon of love in selected medieval lyrical poems and romances of the twelfth and thirteenth century Blütezeit. Origins of courtly love, love and individualism, love and the Church, love and adultery. Not offered every year. GE credit: ArtHum—I. McConnell

168. Multiculturalism in German Literature (4)
Lecture/discussion—3 hours; term paper or discussion—1 hour. Prerequisite: course 22. Examples of German Literature from the High Middle Ages to the present that explore the "encounter with the other" (people of color, different beliefs and cultures, and inner-German minorities). Offered in alternate years. GE credit: ArtHum, Div.—II.

176A. Classic Weimar Cinema (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: Humanities 1. German Weimar (1919-1933) cinema. Fritz Lang, F.W. Murnau, and G.W. Pabst among others. Influence on world-wide (esp. Hollywood) film genres such as film noir, horror, science fiction, and melodrama. Not open for credit to students who have completed Humanities 176. Offered in alternate years. (Same Course as Film Studies 176A.) GE credit: ArtHum, Wrt.—I. Fisher

185. The Age of Bismarck (4)
Discussion—3 hours; term paper. Prerequisite: course 22. Notable literary repercussions of the zenith of Germany's international status at the time of Bismarck's Chancellorship. The poetry of Storm, the prose of Fontane, the drama of Hauptmann. Offered in alternate years. GE credit: ArtHum.—II. Bernd

192. Field Work in German (1-12)
Internship—3-36 hours. Prerequisite: course 109A or consent of instructor. Total immersion program in Germany or a German speaking setting in the U.S. to further develop students proficiency in the German language. May be repeated two times or up to 12 units of credit with consent of instructor. (P/NP grading only.)

194HA-194HB. Honors Program (3-3)
Independent study—2 hours; term paper. Prerequisite: open only to majors with a 3.500 minimum GPA in at least 135 graduation units. (A) Research of an integrative nature (in either "General" or "Area Studies Emphasis" fields of major), guided by thesis advisor chosen by student; (B) Writing of Honors Thesis on topic selected by student in consultation with thesis advisor. (P/NP grading only. Deferred grading only, pending completion of course sequence.)

197T. Tutoring in German (1-4)
Tutorial—3-12 hours. Prerequisite: consent of German Program Director. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with department courses. May be repeated up to eight units of credit. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

202. Middle High German (4)
Discussion—3 hours; lecture—1 hour. Outline of grammar; selections from Middle High German epic, romance, and lyric poetry.—II. (II.) McConnell

206. Cognitive Grammar for Applied Linguists (4)
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing. Analysis of grammar and application of cognitive grammar to language instruction. Syntactical problems and analyses relevant to the language the student will teach. Not offered every year.—III. Arnett

210. Techniques of Literary Scholarship (4)
Seminar—3 hours; term paper. The bibliographical, organizational, and methodological tools and resources for advanced, independent research.—I. (I.)

211. Concepts in Literary Theory (4)
Seminar—3 hours; written reports. Advanced course in concepts of literary theory and criticism. Discussion of the emergence of theoretical concepts and their impact on the understanding and appreciation of literary works. Discussion in German and English, readings in German.—II. (II.)

212. Contemporary Approaches to Literary Theory (4)
Seminar—3 hours; term paper. Study of contemporary theoretical approaches such as structuralism, deconstruction, feminism, Marxism/Frankfurt School, and reception theory in conjunction with the works of major authors.—III. (III.)

239. Narrative and Narrative Theory (4)
Seminar—3 hours; term paper. Studies, in a theoretical and literary historical context, major elements of 19th- and 20th-century narrative, such as techniques of framing, refraction, and montage; narrative perspective; mimesis; and self-consciousness. Focuses on paradigmatic prose texts alongside a spectrum of critical approaches. Offered in alternate years.—I. Finney

240. Forms of German Verse (4)
Seminar—3 hours; term paper. The development of German verse from the Middle Ages to the present, with special emphasis on different techniques of text analysis and interpretation. May be repeated for credit with consent of instructor. Offered in alternate years.—II. Bernd

241. The German Drama (4)
Seminar—3 hours; term paper. The major forms of German drama from its origins to the middle of the twentieth century. May be repeated for credit with consent of instructor.—I. (I.) Finney

242. The German Novelle (4)
Seminar—3 hours; term paper. The major German Novellisten, with particular emphasis on the flowering of this genre in the nineteenth century. May be repeated for credit with consent of instructor.—II. (II.) Bernd

243. Fontane and the Rise of the Modern German Novel (4)
Seminar—3 hours; term paper. Fontane, the father of the modern German novel and the chief German representative of the European novel at its greatest, in the context of the nineteenth-century European political and social scene.—II. (II.) Bernd

244. Gender and Comedy (4)
Seminar—3 hours; term paper. Studies of genre and gender in German-language comedy by male and female writers from the 18th century to the present. Authors treated include Lessing, Kleist, Büchner, Ebner-Eschenbach, Hauptmann, Hofmannsthal, Frisch, Langner, and Jelinek. Offered in alternate years.—III. Finney

252. The Writings of Lessing (4)
Seminar—3 hours; term paper. Study of Lessing's theory of literature with particular emphasis upon his critical attacks on French drama.—I. (I.) Bernd

253. Goethe (4)
Seminar—3 hours; term paper. Study of the origins of Goethe's thought in German Pietism, and his principal artistic, autobiographical, scientific, and philosophical works.—I. (I.) Bernd

254. Schiller (4)
Seminar—3 hours; term paper. A critical analysis of Schiller's major works and his impact on the intellectual climate in Germany during the late eighteenth and early nineteenth centuries.—III. (III.)

255. Aesthetics in the Age of Goethe (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Emergence of aesthetic autonomy from eighteenth century normative poetics during the Age of Goethe. The shift from a model based on the imitation of nature (and the Ancients) to a new concept grounded in the individuality of aesthetic experience.—I.

257. Heinrich von Kleist (4)
Seminar—3 hours; term paper. Kleist's important dramatic and prose works; special attention will be given to the peculiar hermeneutic problems in modern German, French, and Anglo-American Kleist criticism.—III. (III.)

258. The Novels of Thomas Mann (4)
Seminar—3 hours; term paper. Reading of selected novels with emphasis on aesthetic techniques, originality, ethical and political views, and influence on the contemporary literary scene in Germany.—II. (II.)

259. Studies in Kafka (4)
Seminar—3 hours; term paper. Study of Kafka's narrative techniques with special emphasis in the shorter works on the existential development from its roots in Expressionism.—II. (II.)

260. The Poetry of Rilke (4)
Seminar—3 hours; term paper. Study of the principal motifs, myths, images, and problems in the poetry of Rainer Maria Rilke.—I. (I.)

261. Brecht and the Epic Theater (4)
Seminar—3 hours; term paper. A reading of Brecht's works with emphasis on the ideas which impelled the development of new literary forms and concepts.—III. (III.)

262. Studies in Turn-of-the-Century Culture (4)
Seminar—3 hours; term paper. Investigates literary currents in turn-of-the-century Germany and Austria against the background of contemporaneous developments in psychology, the visual arts, philosophy, and music. Authors treated include Hauptmann,

Holz and Schlaf, Schnitzler, T. Mann, Wedekind, Musil, Hofmannsthal. Offered in alternate years.—(II.) Finney

285. Middle High German Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Extensive reading of Middle High German texts in the original language. Examines linguistic and literary problems. May be repeated for credit when topic differs.—III. (III.) McConnell

288. The Renaissance and Reformation in German Literature (4)
Seminar—3 hours; term paper. The parabolic and didactic style in Germany's literature during the sixteenth century. May be repeated for credit with consent of instructor.—I. (I.)

289. German Literature of the Baroque (4)
Seminar—3 hours; term paper. The "Elegantiaideal" and the varying methods used to portray it in seventeenth-century German literature. May be repeated for credit with consent of instructor.—I. (I.)

290. The Enlightenment in German Literature (4)
Seminar—3 hours; term paper. Revolt against the concept of the "Elegantiaideal," and evolution of a new literature based on reason and wit. May be repeated for credit with consent of instructor.—I. (I.)

291. Foreign Language Learning in the Classroom (4)
Seminar—3 hours; project. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (Same course as French 291 and Spanish 291.)—I, II. (I, II.) Anderson, Arnett, Blake, Iwasaki

292. Sentimentality and Sturm und Drang in German Literature (4)
Seminar—3 hours; written reports. Reaction to overemphasis on Reason: theories of Hamann and Herder and works of poets such as Lenz, Leisewitz, the early Goethe and Schiller. May be repeated for credit with consent of instructor.—III. (III.)

293. The Classical Age of German Literature (4)
Seminar—3 hours; term paper. Inquiry into the aesthetic and humanistic qualities of Germany's greatest literary epoch. May be repeated for credit with consent of instructor.—III. (III.) Bernd

294. The Romantic Period in German Literature (4)
Seminar—3 hours; term paper. Survey of the works of early nineteenth-century authors in reaction against the age of classicism. May be repeated for credit with consent of instructor.—I. (I.)

295. Poetic Realism in German Literature (4)
Seminar—3 hours; term paper. Outstanding figures in German literature between 1840 and 1890. Important phases in their developments will be treated. May be repeated for credit with consent of instructor.—I. (I.) Bernd

296. Twentieth-Century German Literature (4)
Seminar—3 hours; term paper. Considers the revolt of the Hauptmann generation, Symbolism, Expressionism, and the chief currents of the contemporary scene. May be repeated for credit with consent of instructor.—I. (I.)

297. Special Topics in German Literature (4)
Seminar—3 hours; term paper. Various special topics in German literature, which may cut across the more usual period and genre rubrics. May be repeated for credit when topic differs.

298. Group Study (1-5)

299. Individual Study (1-12)
(S/U grading only.)

299D. Special Study for the Doctoral Dissertation (1-12)
(S/U grading only.)

Professional Courses

390A. The Teaching of German (2)
Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.)—I. (I.) Arnett

390B. The Teaching of German (2)
Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.)—II. (II.) Arnett

390C. The Teaching of German (2)
Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of new teaching assistants. (S/U grading only.)—III. (III.) Arnett

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Arnett

Professional Course

400. Tutorial and Instructional Internship (1-3)
Discussion—1-3 hours. Prerequisite: graduate standing. Apprentice training in ongoing undergraduate literature courses taught by regular staff, with supplementary weekly critique sessions; intern leadership of discussion sections under staff supervision. May be repeated for credit.—I, II, III. (I, II, III.)

Global and International Studies

(College of Letters and Science)

The interdisciplinary minor in Global and International Studies will enable students not only to learn about global and international issues at UC Davis, but also to gain first-hand academic experience abroad. The minor is also designed to give recognition for upper division course work while studying abroad. However, the minor can also be completed with approved course work taken at UC Davis.

Students will be expected to work closely with an academic adviser in developing an intellectually coherent program of study. Each proposal must be approved by the Faculty Director of the Education Abroad Center,

The minor is sponsored by the Humanities Program. For information, visit the Education Abroad Center website in the Academics Section at *http://eac.ucdavis.edu*.

Minor Program Requirements:

UNITS

Global and International Studies 24

Arts and Humanities Emphasis:

One course from Anthropology 4, 20, International Relations 1, Political Science 3 or Sociology 5 4
One upper division UC Davis general course on global or international studies in the Arts and Humanities 3-4
Course cluster requirement 16-17
The minor requires the selection of interrelated courses totaling a minimum of 16-17 upper division units in area and regional studies or thematic course clusters in global and international studies in the Arts and Humanities.
Suggested course clusters include:
(1) Country or region-specific courses: Western Europe; Russian and East/Central Europe; Asia and the Pacific; Latin and South America; Africa and the Middle East; Jewish Studies; specific countries.
or
(2) Courses clustered around a thematic field in global and international studies: people and nationalities; the individual and society, arts, language, literature and culture.

Study abroad and international internships. The course cluster requirement may be met in one of two ways: *(1)* completion of a minimum of 16-17 units in the course cluster emphasis by taking approved UC Davis upper division courses in the area of global/international studies and/or approved upper division courses taken while participating in EAP or another approved study abroad program, or *(2)* completion of 12 units of course work in a UC Davis accredited international internship, plus UC Davis courses sufficient to total 16-17 units. Those students who are unable to study abroad or participate in an international internship may fulfill the requirement by taking approved global/international courses at UC Davis. Students must meet with the GIS advisor and complete a Course Cluster Worksheet to demonstrate subject interrelatedness.

Social Science Emphasis:

One course from Anthropology 20, International Relations 1, Political Science 3, or Sociology 5 4
One upper division UC Davis general course on global or international studies in the Social Sciences 3-4
Course cluster requirement 16-17
The minor requires the selection of interrelated courses totaling a minimum of 16-17 upper division units in area and regional studies or thematic course clusters in global and international studies in the Social Sciences.
Suggested course clusters for the Social Science Emphasis:
(1) Country or region-specific courses in the Social Sciences: Western Europe; Russian and East/Central Europe; Asia and the Pacific; Latin and South America; Africa and the Middle East; Jewish Studies; specific countries.
or
(2) Courses clustered around a thematic field in global and international studies: world trade and development; peace and security; global environment, health, and natural resources.

Study abroad and international internships. The course cluster requirement may be met in one of two ways: (*1*) completion of a minimum of 16-17 units in the course cluster emphasis by taking approved UC Davis upper division courses in the area of global/international studies and/or approved upper division courses taken while participating in EAP or another approved study abroad program, or (*2*) completion of 12 units of course work in a UC Davis accredited international internship, plus UC Davis courses sufficient to total 16-17 units. Those students who are unable to study abroad or participate in an international internship may fulfill the requirement by taking approved global/international courses at UC Davis. Students must meet with the GIS advisor and complete a Course Cluster Worksheet to demonstrate subject interrelatedness.

Restrictions. No more than two courses from a single UC Davis department may be offered in satisfaction of the minor requirements.

Foreign language study. Students are strongly encouraged to study a foreign language, particularly the language of the country in which and about which they intend to study. However, only upper division course work may be used to fulfill requirements for the minor.

Greek

See Classics, on page 191.

Health Informatics (A Graduate Group)

Formerly Medical Informatics (A Graduate Group)

Peter Yellowlees, M.B.B.S., M.D., Chairperson of the Group

Group Office.
UC Davis Health System
Health Informatics Program
2450 48th St., Suite 2800, Sacramento, CA 95817
(916) 734-8710; *healthinformatics@ucdavis.edu*

Faculty

Aaron Bair, M.D., M.S.c., Associate Professor *(Emergency Medicine)*
Matt Bishop, Ph.D., Professor *(Computer Science)*
Robert Cardiff, M.D., Ph.D., Professor *(Pathology and Laboratory Medicine)*
James Case, M.S., D.V.M., Ph.D., Professor *(California Animal Health & Food Safety Laboratory System)*
Anthony Cheung, Ph.D. Professor Emeritus and Vice Chair *(Pathology and Laboratory Medicine)*
Mary Christopher, D.V.M., Ph.D., Professor *(Pathology, Microbiology, and Immunology)*
Cristina Davis, Ph.D., Assistant Professor *(Mechanical and Aerospace Engineering)*
Tom Engel, M.D., Associate Professor *(Anesthesiology and Pain Medicine)*
Regina Gandour-Edwards, M.D., Professor *(Pathology and Laboratory Medicine)*
Estella Geraghty, M.D., M.S., M.P.H, Assistant Professor of Clinical Internal Medicine *(General Medicine)*
Fred Gorin, M.D., Ph.D., Professor *(Neurology)*
Bernd Hamman, Ph.D., Professor *(Computer Science)*
Donald Hilty, M.D., Associate Professor *(Psychiatry)*
Michael Hogarth, M.D., Associate Professor *(Pathology and Laboratory Medicine)*
Christine Hotz, D.V.M., M.S., Assistant Adjunct Professor *(Health Informatics)*
Janet Ilkiw, B.V.Sc., Ph.D., Professor *(Surgical and Radiological Sciences)*
Anthony Jerant, M.D., Associate Professor *(Family and Community Medicine)*
Patrice Koehl, Ph.D., Associate Professor *(Computer Science)*
Bertram Ludaescher, Ph.D., Associate Professor *(Computer Science)*
James Marcin, M.D., M.P.H., Associate Professor *(Pediatrics)*
Thomas Nesbitt, M.D., M.P.H., Professor *(Family and Community Medicine)*
Alberto Odor, M.D., Associate Professor *(Anesthesiology and Pain Medicine)*
J. Anthony Seibert, Ph.D., Professor *(Radiology)*
Ton, Hendry, M.D., M.S., Associate Professor *(Psychiatry)*
Yang, Xiaowei, Ph.D., Assistant Professor *(Biostatistics)*
Peter Yellowlees, M.B.B.S., M.D, Professor *(Psychiatry)*

Emeriti Faculty

Richard Walters, Ph.D., Professor Emeritus *(Computer Science)*

Affiliated Faculty

Mark Carroll, M.P.H., Lecturer *(Pathology and Laboratory Medicine)*
Elizabeth Gibson, M.S.C.Phil, Director, Academic Technology Services
Glenna Gobar, D.V.M., M.P.V.M., M.S., Public Health Informatics Specialist *(Pathology Informatics Core)*
Cecil Lynch, M.D., M.S., Volunteer Clinical Faculty *(Health Informatics)*
Terri Malmgren, M.L.S., Head Librarian *(Carlson Health Sciences Library)*
Wasyl Malyj, Ph.D., Director *(Bioinformatics Core-NIH NCMHD Center of Excellence in Nutritional Genomics)*
Michael Minear, Chief Information Officer *(UC Davis Health System)*
Larry Ozeran, M.D., Volunteer Clinical Faculty *(Health Informatics)*

Graduate Study. The Group currently offers an M.S. degree in Health Informatics. The program is primarily designed for clinicians (M.D., D.O., D.V.M., V.M.D., M.P.H., Pharm.D., R.N., others) and healthcare IT professionals with Bachelor's degree. The course of study provides research-oriented training that spans the use of computer systems in medicine today, including methods for clinical data acquisition, storage, and retrieval, the development, use and implementation of the electronic medical record, management of clinical data, and the use of medical decision support systems. A research project and thesis are mandatory degree requirements.

Preparation. The Group encourages applications from clinicians and healthcare IT professionals who have had experience in the manipulation of clinical information. Basic qualifications include an advanced degree in a health-related field or the equivalent in work experience. Proof of proficiency in a programming language is required. Applicants with extensive computer science or information technology background but little knowledge of clinical information would need to gain considerable practical experience in dealing with clinical information to be competitive in applying to the program.

Graduate Advisors. E. Geraghty *(General Medicine)*, M. Hogarth *(Pathology and Laboratory Medicine)*, C. Hotz *(Health Informatics)*, P. Yellowlees *(Psychiatry)*

Courses in Health Informatics (MHI)

Graduate Courses

202. Computer-Based Patient Records (4)
Lecture/discussion—3 hours; discussion—1 hour. Prerequisite: current enrollment within the Health Informatics graduate program or consent of instructor. Introduction and overview of computer-based clinical record systems. Topics include data modeling, health system standards and terminologies; security, privacy and confidentiality; workflow modeling; data visualization; legal; decision support; public health; and evidence-based practice.—III. (III.) Turner

207. Decision Support Systems (4)
Lecture/discussion—2 hours. Prerequisite: consent of instructor. Explores decision support systems for medical application. Topics include medical decision making, uncertainty, review of existing decision support systems, knowledge engineering, data mining, and knowledge based systems.—II. (II.) Malyj

208. Medical Informatics in Web-Based Enterprise Computing (4)
Lecture—2 hours; discussion—2 hours. Introduction to the decision making processes and technologies that are involved in developing Web-based distributed enterprise applications in medicine. Focus on the Informatician's role as a team member.—II. (II.) Lynch

209. Data Acquisition and Analysis (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Examines the nature, acquisition, and analysis of medical data. Data ranges from signals of electrical potentials, sounds, text, images (still and motion), and data from nucleic acid and protein expression and sequencing instruments.—I. (I.) Malyj

210. Introduction to Health Informatics (4)
Lecture—3 hours; discussion—1 hour. Overview course to give the student a broad exposure to the field of Health Informatics. Topics covered include, but are not limited to, networking, information systems, coding, HL7, Security, and HIPPA.—I. (I.) Galvez

211. Telemedicine (4)
Web virtual lecture—3 hours; web electronic discussion—1 hour. Issues for the development and maintenance of a successful telemedicine program with focus on strategic planning, clinical applications, project management, risk management and legal issues; reimbursement and contracting; human resources and program sustainability.—I, II, III. (I, II, III.) Yellowlees

215. Beginning and Intermediate Programming in M (MUMPS) (3)
Lecture—3 hours. Project-oriented approach to fundamentals of programming in ANSI Standard M (MUMPS) language. Basic syntax, Hierarchical file structure; arrays and string subscripts, indirection and extrinsic functions. (S/U grading only.)—I, II, III. (I, II, III.) Walters

289A-G, H-I. Special Topics in Medical Informatics (1-5)
Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in (A) Data Acquisition, (B) Electronic Medical Information, (C) Computer Based Patient Records, (D) Decision Support, (E) Medical Image Analysis, (G) Biostatistics, (H) Modeling Biological Systems, (I) Coding Systems. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

289F. Database and Knowledge Management (4)
Lecture/discussion—3 hours; term paper. Prerequisite: consent of instructor. Course objectives include understanding the informatics techniques for data capture, information management, and knowledge generation that a student will use throughout their career. May be repeated for credit.—I, II, III. (I, II, III.) Lynch

290. Seminar in Medical Informatics (1)
Seminar—1 hour. Restricted to 20 students. Discussion of current graduate research and topics in Health Informatics. Oral presentations of individual study. (S/U grading only.)—I, II, III. (I, II, III.)

299. Research in Health Informatics (1-12)
Independent research in Health Informatics. (S/U grading only.)—I, II, III. (I, II, III.)

Hebrew

See Classics, on page 191.

Hindi

See Classics, on page 191.

History

(College of Letters and Science)

David Biale, Ph.D., Chairperson of the Department

Department Office. 2216 Social Sciences and Humanities Building
(530) 752-0776; *http://history.ucdavis.edu*

Faculty

David Biale, Ph.D., Professor
Beverly Bossler, Ph.D., Professor
Diana Davis, Ph.D., Associate Professor
Corrie Decker, Ph.D., Assistant Professor
Edward Dickinson, Ph.D., Associate Professor
Omnia El Shakry, Ph.D., Associate Professor
A. Katie Harris, Ph.D., Associate Professor
Ellen Hartigan-O'Connor, Ph.D., Associate Professor
Ari Kelman, Ph.D., Associate Professor

Kyu H. Kim, Ph.D., Associate Professor
Catherine J. Kudlick, Ph.D., Professor
Norma B. Landau, Ph.D., Professor
Victoria Langland, Ph.D., Assistant Professor
Benjamin Lawrance, Ph.D., Assistant Professor
Lisa Materson, Ph.D., Associate Professor
Sally McKee, Ph.D., Professor
Susan G. Miller, Ph.D. Associate Professor
Kathryn S. Olmsted, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Lorena Oropeza, Ph.D., Associate Professor
Eric Rauchway, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Andrés Reséndez, Ph.D., Professor
Michael Saler, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Sudipta Sen, Ph.D., Professor
John Smolenski, Ph.D., Associate Professor
Stylianos Spyridakis, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Daniel Stolzenberg, Ph.D., Assistant Professor
Kathleen Stuart, Ph.D., Associate Professor
Alan S. Taylor, Ph.D., Professor
UC Davis Prize for Teaching and Scholarly Achievement
Baki Tezcan, Ph.D., Associate Professor
Cecilia Tsu, Ph.D., Assistant Professor
Charles Walker, Ph.D., Professor
Clarence E. Walker, Ph.D., Professor
Louis S. Warren, Ph.D., Professor

Emeriti Faculty

Arnold J. Bauer, Ph.D., Professor Emeritus
Robert Borgen, Ph.D., Professor Emeritus
William M. Bowsky, Ph.D., Professor Emeritus
Cynthia L. Brantley, Ph.D., Professor Emerita
David Brody, Ph.D., Professor Emeritus
Joan Cadden, Ph.D., Professor Emerita
Daniel H. Calhoun, Ph.D., Professor Emeritus
Robert O. Crummey, Ph.D., Professor Emeritus
Manfred P. Fleischer, Ph.D., Professor Emeritus
William W. Hagen, Ph.D., Professor Emeritus
Thomas H. Holloway, Ph.D., Professor Emeritus
David L. Jacobson, Ph.D., Professor Emeritus
Susan L. Mann, Ph.D., Professor Emerita
Ted W. Margadant, Ph.D., Professor Emeritus
Barbara Metcalf, Ph.D., Professor Emerita
Rollie E. Poppino, Ph.D., Professor Emeritus
Don C. Price, Ph.D., Professor Emeritus
Ruth E. Rosen, Ph.D., Professor Emerita
Academic Senate Distinguished Teaching Award
Morton Rothstein, Ph.D., Professor Emeritus
Richard N. Schwab, Ph.D., Professor Emeritus
Wilson Smith, Ph.D., Professor Emeritus
F. Roy Willis, Ph.D., Professor Emeritus
UC Davis Prize for Teaching and Scholarly Achievement

The Major Program

The History major develops critical intelligence and fosters an understanding of ourselves and our world through the study of the past—both remote and recent.

The Program. A student electing a major in History may complete Plan I or Plan II. Plan I enables students to receive a broad education in histories of several geographic areas. Plan II encourages interested students, including those preparing for graduate work in history, to enroll in a seminar, to undertake independent work, and to study the history of historical thought as part of the major. Students preferring more active engagement in research and writing are encouraged to follow Plan II.

Career Alternatives. A degree in history is excellent preparation for a professional career such as teaching, law, journalism, public administration, or business management. Professional schools in these and related fields are looking for students who can weigh conflicting evidence, evaluate alternative courses of action or divergent points of view, and express conclusions logically in everyday language. These analytical skills are stressed in history classes, and their mastery gives the history student a solid preparation for subsequent training in a specialized career.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter (Plan I or II) 20

Five lower division courses chosen from the following six fields, including at least two from one field, one from a second field, and one from a third field. The fifth course can be taken from any field 20
(a) African and Middle East History: History 6, 15
(b) Asian History: History 6, 8, 9A, 9B
(c) European History: History 3, 4A, 4B, 4C
(d) Latin American History: History 7A, 7B, 7C
(e) U.S. History: History 17A, 17B, 72A, 72B
(f) World History: History 10A, 10B, 10C

Depth Subject Matter—Plan I 40-41

Four upper division courses from one of the fields of concentration listed below..... 16
Two upper division courses from one of the other fields of concentration listed below..... 8
Two upper division courses from a field or fields other than those chosen to satisfy the two preceding requirements 8
One additional upper division course chosen from any of the fields 4
One course from the following: History 101 or 102 or 103 (in field of concentration)..... 4-5
One of the courses taken to fulfill the above requirements must deal with premodern history.

Total Units for the Major, Plan I..... 60-61

Depth Subject Matter—Plan II..... 42

Four upper division courses from one of the fields of concentration listed below. Include a two-quarter sequence of courses 16
Three upper division courses from one of the other fields listed..... 12
History 101..... 5
History 102 in field of concentration (in exceptional circumstances, a student may, with the permission of an adviser, take the seminar in another field) 5
History 103 in field of concentration 4
One of the courses taken to fulfill the above requirements must deal with premodern history.

Total Units for the Major, Plan II..... 62

Fields of Concentration

(a) Europe: History 102A, 102B, 102C, 102D, 102E, 102F, 102I, 102P, 102X, 109A, 109B, 111B, 111C, 112A, 112B, 121A, 121B, 121C, 122, 125, 130A, 130B, 130C, 131A, 131B, 131C, 132, 133, 134A, 135A, 135B, 136, 138A, 138B, 138C, 139A, 139B, 140, 141, 142A, 142B, 143, 144A, 144B, 145, 146A, 146B, 147A, 147B, 147C, 148A, 148B, 148C, 149, 151A, 151B, 151C, 151D, 160.
(b) United States History: History 102K, 102L, 102M, 102X, 169A, 169B, 170A, 170B, 170C, 171A, 171B, 171D, 172, 173, 174A, 174B, 174C, 174D, 175, 176A, 176B, 177A, 177B, 178A, 178B, 179, 180A, 180B, 180C, 181, 183A, 183B, 184, 185A, 185B, 188A, 188B, 189.
(c) Asian History: History 102G, 102H, 102N, 102Q, 102R, 102X, 109A, 109B, 110, 111A, 112A, 112B, 113, 190A, 190B, 190C, 190D, 191A, 191B, 191C, 191D, 191E, 191F, 193A, 193B, 193C, 194A, 194B, 194C, 194D, 194E, 195B, 196A, 196B.
(d) African History: 102O, 102X, 109A, 109B, 110, 115A, 115B, 115C, 115D, 115E, 115F, 116.
(e) Latin American History: History 102J, 102X, 109A, 109B, 110, 160, 162, 163A, 163B, 164, 165, 166A, 166B, 167, 168, 169A, 169B.
(f) Within broad fields, a student may wish to concentrate some of the courses on a particular area or period, such as China or Great Britain or Medieval Europe. Special approval is not required.

Major Advisers. See the department's website for updated information.

History and Philosophy of Science. Courses from the History and Philosophy of Science program may count toward the History major. History and Philosophy of Science 130A fulfills upper division requirements in the field of pre-industrial Europe. History and Philosophy of Science 130B, 150, and 180 fulfill upper division requirements in either the U.S. or Modern Europe field.

Students can create a field in the History of Science upon consultation with a faculty adviser. They may draw upon the relevant History courses (History 85, 135A, 135B, 139A, 139B, 185A, and 185B) as well as History and Philosophy of Science offerings to do so.

Consult the History and Philosophy of Science program for a more detailed description of course offerings this area and the minor in History and Philosophy of Science.

Minor Program Requirements:

The minor in History consists of five upper division courses chosen so that at least three courses are in one field and at least one course is in another field. The two fields shall be chosen from among those defined in the catalog for the major. However, students may also, in consultation with and with the authorization of a faculty adviser, define other thematic fields.

UNITS

History 20

At least 20 units of upper division history courses..... 20
Examples of minor with thematic emphasis: Pre-Law (British and American Political and Constitutional Development); The Twentieth Century; The History of Ideas in Society.

Minor Advisers. Same as major advisers.

Honors and Honors Program. A student becomes eligible for graduation with honors by meeting the minimum GPA (usually 3.500) and course requirements established by the College of Letters and Science. To qualify for high or highest honors, students must also complete the History Department honors program with a GPA of 3.500 or above and write a thesis that meets the criteria for high honors or highest honors. Students apply to participate in the department honors program during the latter part of their junior year. Admission to the program is based on GPA, a thesis proposal, examples of previous writing, and the recommendation of a faculty member who is willing to sponsor the student's project, interviews, and faculty recommendations. Students admitted to the program must complete the History 104A, 104B, 104C sequence of honors courses, which requires the completion of a senior honors thesis. Students who anticipate seeking admission to the honors program are urged to complete at least one History 102 (under-graduate seminar) before the end of their junior year. Interested students are urged to consult with faculty in their field early in their junior year. Students may follow either Plan I or Plan II described above, and may substitute History 104B and 104C for any courses in their program other than History 102.

Students who anticipate pursuing graduate work in history or a teaching credential, and who do not wish to opt for the research emphasis embodied in the honors program, are encouraged to select Plan II of the major.

Study Abroad and the History Major. The department strongly encourages interested students to pursue their studies abroad. While there are no

specific required courses or prerequisites, students are urged to take at least one history course that touches upon the geographic area where they plan to study abroad before departing. To receive a history degree from UC Davis, students must complete at least 18 upper division units in the history major at UC Davis (which can also include History 101, 102, 103). The remaining major requirements can be fulfilled abroad provided that *(a)* the course should be evaluated as at least four UC Davis units, *(b)* the course should be considered upper division by the standards set forth by the Education Abroad Program, or *(c)* the student presents copies of the course work, syllabus, and writing assignments to the department's liaison person with the EAP office for approval.

Note: students who wish to receive credit for courses taken abroad under programs other than EAP may petition the Undergraduate Program Committee to do so.

Teaching Credential Subject Representative. See the Teaching Credential/M.A. Program on page 114.

Waiver Program for Single-Subject Teaching Credential in History. The Department of History is currently working with the School of Education to develop a program of study to satisfy the California Teaching Commission's Subject Matter Competency requirement for the single subject credential in history/social science. For more information, contact Pamela Tindall at the Area 3 History and Cultures Project in 267 Social Science & Humanities Building.

Graduate Study. The Department of History offers programs of study and research leading to the M.A. and Ph.D. degrees in history. Detailed information may be obtained by writing to the Graduate Adviser, Department of History.

Graduate Advisers. See the department's website for updated information.

American History and Institutions. This University requirement can be satisfied by passing any one of the following courses in History: 17A, 17B, 72A, 72B, 170A, 170B, 170C, 171A, 171B, 172, 173, 174A, 174B, 174C, 174D, 175, 176A, 176B, 177A, 177B, 178A, 178B, 180A, 180B, 181, 183A, 183B, 184, 189. The upper division courses may be used only with the consent of the instructor; see also under University requirements.

Courses in History (HIS)

Lower Division Courses

3. Cities: A Survey of World Cultures (4)
Lecture—3 hours; lecture/discussion—1 hour. Survey of urban world cultures, focusing on up to ten cities selected by the instructor. GE Credit: ArtHum or SocSci, Div, Wrt.

4A. History of Western Civilization (4)
Lecture—3 hours; discussion—1 hour. Growth of western civilization from late antiquity to the Renaissance. GE credit: ArtHum, Wrt.—I. (I.)

4B. History of Western Civilization (4)
Lecture—3 hours; discussion—1 hour. Development of western civilization from the Renaissance to the Eighteenth Century. GE credit: ArtHum, Wrt.—I, II, III. (I, II, III.)

4C. History of Western Civilization (4)
Lecture—3 hours; discussion—1 hour. Development of Western Civilization from the Eighteenth Century to the present. GE credit: ArtHum, Wrt.—I, II. (I, II.)

6. Introduction to the Middle East (4)
Lecture—3 hours; discussion—1 hour. Survey of the major social, economic, political and cultural transformations in the Middle East from the rise of Islam (c. 600 A.D.) to the present, emphasizing themes in religion and culture, politics and society. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—I. Anooshahr, El Shakry, Teczan

7A. History of Latin America to 1700 (4)
Lecture—3 hours; discussion—1 hour. Introduction to the history of Spanish and Portuguese America from the late pre-Columbian period through the initial phase and consolidation of a colonial regime (circa 1700). Topics include conquest, colonialism, racial mixture, gender, and labor systems. GE credit: ArtHum or SocSci, Div, Wrt.—I. (I.)

7B. History of Latin America, 1700-1900 (4)
Lecture—3 hours; discussion—1 hour. Latin America from colony to republic. The nature of Iberian colonialism, the causes for independence, the creation of nation states, the difficulties in consolidating these nations, and the rise of Liberalism and export economics in the nineteenth century. GE credit: ArtHum or SocSci, Div, Wrt.—II. (II.)

7C. History of Latin America, 1900-present (4)
Lecture—3 hours; discussion—1 hour. Latin America since the beginning of the 20th century. Themes include export economies, oligarchic rule, crises of depression and war, corporatism, populism revolution and reform movements, cultural and ethnic issues, U.S.-Latin American relations, neo-liberal restructuring. GE credit: ArtHum or SocSci, Div, Wrt.—III. (III.)

8. History of Indian Civilization (4)
Lecture—3 hours; discussion—1 hour; written reports. Survey of Indian civilization from the rise of cities (ca. 2000 B.C.) to the present, emphasizing themes in religion, social and political organization, and art and literature that reflect cultural interaction and change. GE credit: ArtHum, Div.—III. (III.) Sen

9A. History of East Asian Civilization (4)
Lecture—3 hours; discussion—1 hour. Surveys traditional Chinese civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary China are provided. GE credit: ArtHum, Div, Wrt.—II, III. (II, III.)

9B. History of East Asian Civilization (4)
Lecture—3 hours; discussion—1 hour. Surveys traditional Japanese civilization and its modern transformation. Emphasis is on thought and religion, political and social life, art and literature. Perspectives on contemporary Japan are provided. GE credit: ArtHum, Div, Wrt.—I. (I.)

10A. World History to 1350 (4)
Lecture—3 hours; discussion—1 hour. Historical examination of the changing relationship of human societies to one another and to their natural settings through the year 1350, with particular attention to long-term trends and to periodic crises that reshaped the links of culture and nature on a global scale. GE credit: ArtHum or SocSci, Div, Wrt.—I. Lawrance

10B. World History, c. 1350-1850 (4)
Lecture—3 hours; discussion—1 hour. Major topics in world history from the 14th century to the beginning of the 19th century. Topics will vary but may include oceans as systems of human communication and conflict; the global consequences of "industrious revolutions" in Europe and Asia, etc. GE credit: ArtHum, Wrt.—II.

10C. World History III (4)
Lecture—3 hours; discussion—1 hour. Major topics from world history of the 19th and 20th centuries, emphasizing the rise and fall of Western colonial empires; Cold War and the superpowers; the spread of the nation-states; and process of globalization. GE credit: ArtHum, Wrt.—III. (III.)

15. Introduction to African History (4)
Lecture—3 hours; discussion—1 hour. Examination of the long-range historical context as background to current conditions in Africa. Includes the early development of African civilizations, the slave trade and its abolition, 20th century colonization, and African independent states. GE credit: ArtHum, Div, Wrt.—I. (I.) Decker, Lawrance

17A. History of the United States (4)
Lecture—3 hours; discussion—1 hour. The experience of the American people from the Colonial Era to the Civil War. GE credit: ArtHum, Div, Wrt.—I, II. (I, II.)

17B. History of the United States (4)
Lecture—3 hours; discussion—1 hour. The experience of the American people from the Civil War to the end of the Cold War. Not open for credit to students who have completed course 17C. GE credit: ArtHum, Div, Wrt.—II, III. (II, III.)

72A. Social History of American Women and the Family (4)
Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles and the family from colonial America until the late nineteenth century emphasizing changes resulting from the secularization, commercialization, and industrialization of American society. GE credit: ArtHum, Div, Wrt.—I. (I.) Hartigan-O'Connor

72B. Social History of American Women and the Family (4)
Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles, and the family in twentieth-century America, emphasizing female reformers and revolutionaries, working class women, consumerism, the role of media, the "feminine mystique," changes in family life, and the emergent women's movement. GE credit: ArtHum, Div, Wrt.—II. (II.) Materson

85. Nature, Man, and the Machine in America (4)
Seminar—4 hours; term paper. Prerequisite: consent of instructor. History of the attitudes and behavior of Americans toward their natural environment and their technology, from colonial times to the present. No final examination. Limited enrollment. GE credit: ArtHum.

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

101. Introduction to Historical Thought and Writing (5)
Lecture/discussion—4 hours; term paper. Prerequisite: consent of instructor. Study of the history of historical thought and writing, analysis of critical and speculative philosophies of history and evaluation of modes of organization, interpretation, and style in historical writing.—III. (III.)

102A-S, X. Undergraduate Proseminar in History (5)
Seminar—3 hours; term paper. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. (A) Ancient; (B) Medieval; (D) Modern Europe to 1815; (E) Europe since 1815; (F) Russia; (G) China to 1800; (H) China since 1800; (I) Britain; (J) Latin America since 1810; (K) American History to 1787; (L) United States, 1787-1896; (M) United States since 1896; (N) Japan; (O) Africa; (P) Christianity and Culture in Europe, 50-1850; (Q) India; (R) Muslim Societies; (S) Education Abroad Program; (X) Comparative History, selected topics in cultural, political, economic, and social history that deal comparatively with more than one geographic field. May be repeated for credit. Limited enrollment.—I, II, III. (I, II, III.)

103. Topics in Historical Research (4)
Discussion—3 hours; individual consultation with instructor; term paper. Prerequisite: consent of instructor. Individual research resulting in a research paper on a specific topic in one of various fields of history. May be repeated for credit.

104A. Introduction to Historical Research and Interpretation (4)
Seminar—3 hours; term paper. Prerequisite: acceptance into History Department Honors Program. Directed reading and research aimed at preparing students to select appropriate topics and methodolo-

gies for a senior honors essay and to situate their topics within a meaningful, broad context of historical interpretations. Culminates in the submission of a full prospectus for an honors essay.—I. (I.) Oropeza

104B. Honors Thesis (4)
Tutorial—4 hours. Prerequisite: course 104A. Research in preparation of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of sequence.)—II.

104C. Honors Thesis (4)
Tutorial—4 hours. Prerequisite: course 104A and 104B. Completion of a senior honors thesis under the direction of a faculty adviser. (Deferred grading only, pending completion of sequence.)—III.

109A. Global Environmental History (4)
Lecture/discussion—3 hours; project. Global, comparative study of how environmental change, human perceptions of nature, and manipulations of nature have changed over time. Primary focus post-1500, emphasis on critically analyzing many common ideas of environmental change. GE Credit: ArtHum, SocSci.—II. (II.) Davis

109B. Environmental History of Disease and Public Health (4)
Lecture/discussion—3 hours; project. Restriction to upper division standing. Disease from prehistory to the present in global perspective; the origins of pathogens in human manipulations of the environment and how people and governments have mobilized to contain or eliminate them.—III. (III.) Davis

110. Themes in World History (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. Issues and topics in world history. Topics will emphasize the interaction of diverse regions of the world as well as common patterns of historical change. May be repeated for credit if topic and/or instructor differs. GE Credit: ArtHum or SocSci, Div, Wrt.

111A. Ancient History (4)
Lecture—3 hours; discussion or paper (student option). History of ancient empires of the Near East and of their historical legacy to the Western world. GE credit: ArtHum, Wrt.—II. (II.) Spyridakis

111B. Ancient History (4)
Lecture—3 hours; discussion or paper (student option). Political, cultural and intellectual study of the Greek world from Minoan-Mycenaean period to end of Hellenistic Age. GE credit: ArtHum, Wrt.—III. (III.) Spyridakis

111C. Ancient History (4)
Lecture—3 hours; discussion or paper (student option). Development of Rome from earliest times. Rise and fall of the Roman Republic; the Empire to 476 A.D. GE credit: ArtHum, Wrt.—II. (II.) Spyridakis

112A. Topics in Pre-Modern Jewish History (4)
Lecture—3 hours; term paper. Topics in the history of Jews from the Biblical era to the eras of Jewish emancipation. Topics can be framed chronologically (e.g., medieval Jewry) or thematically (e.g., trade and Jewish communities). May be repeated one time for credit. GE credit: ArtHum, Div, Wrt.—I. (I.)

112B. Topics in Modern Jewish History (4)
Lecture—3 hours; term paper. Topics in the history of Jews from the era of Jewish emancipation to the present. Topics can be framed chronologically or thematically (e.g. Zionism, assimilation, the post Holocaust Diaspora). May be repeated one time for credit. GE credit: ArtHum, Div, Wrt.—III. (III.)

113. History of Modern Israel (4)
Lecture—3 hours; term paper. Topics include the rise and fall of utopian Zionism, the century-long struggle between Jews and Arabs, the development of modern Hebrew culture, the conflict between religious and secular Jews, and the nature of Israel's multicultural society. GE credit: ArtHum, Div, Wrt.—II. (II.) Biale

115A. History of West Africa (4)
Lecture—3 hours; term paper. Prerequisite: course 15 recommended. Introductory survey of the history of West Africa and/or the Congo region from the earliest times to the present. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—Lawrance

115B. History of East and Central Africa (4)
Lecture—3 hours; term paper. Prerequisite: course 15 recommended. Introductory survey of the history of east and central Africa from earliest times to the present. GE credit: ArtHum, Div, Wrt.—Decker, Lawrance

115C. History of Southern Africa (4)
Lecture—3 hours; term paper. Prerequisite: course 15 recommended. Introductory survey of the history of Southern Africa (including South Africa) from earliest times to the present. GE credit: ArtHum, Div, Wrt.—Decker, Lawrance

115D. History and Legacy of Colonialism in Africa (4)
Lecture—3 hours; term paper. Prerequisite: course 115A, 115B or 115C recommended. History of the implementation, development, and legacy of European Colonialism in Africa. A comparison of British, Belgian, French, and Portuguese colonial efforts and impacts. GE credit: SocSci, Div, Wrt.—I. (I.)

115E. The African Slave Trade (4)
Lecture—3 hours; writing—1 hour. History of the African Slave trades, from the early Egyptian and Saharan trades in the pre-modern period to the trans-Atlantic trade (15th-19th century) and the contemporary trafficking of humans. GE credit: ArtHum, Div, Wrt.—III. (III.) Lawrance

115F. History of North, Horn, Sudan and Nile Valley (North and North-East Africa) (4)
Lecture—4 hours; term paper. This course shall investigate the history of the north and northeast regions of continental Africa, encompassing the Mediterranean Coast, Maghreb, Sahara, Horn of Africa, the Nile Valley and the Sudan, covering the ancient period to the present. May be repeated up to four units for credit when instructor differs. GE Credit: ArtHum or SocSci, Div, Wrt.—I, III. (I, III.) El Shakry, Lawrance

116. African History: Special Themes (4)
Lecture—3 hours; term paper. Prerequisite: courses 115A and 115B recommended. Themes of African history, such as African states and empires, slave trade, relationship of Egypt to rest of Africa, Bantu origins and migrations, and French policy of Assimilation and Association. GE credit: ArtHum.

121A. Medieval History (4)
Lecture/discussion and panel presentations—3 hours. European history from "the fall of the Roman Empire" to the eighth century. GE credit: ArtHum, Wrt.—I. (I.)

121B. Medieval History (4)
Lecture/discussion and panel presentations—3 hours. European history from Charlemagne to the twelfth century. GE credit: ArtHum, Wrt.—III. (III.) McKee

121C. Medieval History (4)
Lecture/discussion and panel presentations—3 hours. European history from the Crusades to the Renaissance. GE credit: ArtHum, Wrt.—I. (I.) McKee

122. Selected Themes in Medieval History (4)
Lecture—3 hours; term paper. Each offering will focus on single major theme, such as medieval agrarian history, feudalism, the family, medieval Italy, or the Crusades. Readings include original sources in English translation and modern works. May be repeated for credit. GE credit: ArtHum.—III. (III.)

125. Topics in Early Modern European History (4)
Laboratory/discussion—3 hours; term paper. Prerequisite: course 4B recommended. Social and cultural history, 1300-1800. Topics such as medieval and Renaissance Italy, early modern Italy, Ancient Regime France, family and sexuality, and material culture and daily life. May be repeated for credit. GE credit: ArtHum, Wrt.—III. (III.)

130A. Christianity and Culture in Europe: 50-1450 (4)
Lecture—3 hours; written report or research paper. A history of the ideas and institutions of Christianity and their impact on the late Roman Empire and medieval Europe in terms of outlook on life, art, politics and economics. GE credit: ArtHum, Div, Wrt.—II. (II.)

130B. Christianity and Culture in Europe: 1450-1600 (4)
Lecture—3 hours; written report or research paper. A history of the Lutheran, Zwinglian-Calvinist, Radical, Anglican, and Catholic Reformations as foundation stones of a new culture in Europe, with special attention to the interconnections between the revival of antiquity and the different reform movements. GE credit: ArtHum.—II. (II.) Harris

130C. Christianity and Culture in Europe: 1600-1850 (4)
Lecture—3 hours; written report or research paper. A survey of the intellectual, cultural and political reorientation of European society in the aftermath of the Wars of Religion. "Secularization" will be discussed in the context of the Enlightenment and Romanticism. GE credit: ArtHum.

131A. Early Modern European History (4)
Lecture—3 hours; written reports. Prerequisite: courses 4A and 4B recommended. Western European history from about 1350 to about 1500. GE credit: ArtHum.—Stuart

131B. European History During the Renaissance and Reformation (4)
Lecture—3 hours; term paper. Survey of European society, politics, and culture from the late 15th through the early 17th centuries, with particular focus on the Italian and Northern Renaissance, on the Protestant Reformation, and the Catholic Counter Reformation. GE credit: ArtHum, Wrt.—II. (II.) Stuart

131C. The Old Regime: Absolution, Enlightenment and Revolution in Europe (4)
Lecture—3 hours; term paper. Survey of European society, politics, and culture in the 17th and 18th centuries, focusing on religious warfare, absolutism, Scientific Revolution, Enlightenment and the growth of religious tolerance, the French Revolution and the collapse of the old regime. GE credit: ArtHum, Wrt.—II. (II.) Stuart

132. Crime and Punishment in Early Modern Europe (4)
Lecture—3 hours; term paper. Deviance and crime in early modern Europe, contrasting imaginary crimes, e.g. witchcraft, with "real" crimes such as highway robbery and infanticide. Examines impact of gender, sexual orientation, ethnicity, and class in processes of criminalization. GE credit: SocSci, Div, Wrt.—II. (II.) Stuart

133. The Age of Ideas (4)
Lecture—3 hours; written reports. The Enlightenment and its background in the seventeenth century. GE credit: ArtHum.—Stolzenberg

134A. The Age of Revolution (4)
Lecture—3 hours; written reports. Ideas and institutions during the French Revolution and the Napoleonic era. GE credit: ArtHum.—I. (I.)

135A. History of Science to the 18th Century (4)
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Survey of the historical development of science, technology, and medicine from the ancient world to the eighteenth century, with special emphasis on Isaac Newton as the culmination of the seventeenth century scientific revolution. GE credit: ArtHum.—Stolzenberg

135B. History of Science, 18th to 20th Centuries (4)
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Survey of the historical development of scientific thought in geology, biology, chemistry, physics, and cosmology from the

eighteenth to the twentieth century, with special emphasis on emergence of broad explanatory principles that serve more than one science. GE credit: ArtHum.—I. (I.)

136. Scientific Revolution (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 135A or 135B recommended. History of science in Western Europe (1400-1750). Investigates the changing definitions of science in the age of Copernicus, Versalius, Harvey, Galileo and Newton. Considers the evolution of new ideas about nature, experiment, observation, and scientific theory. GE credit: ArtHum, Wrt.—III. (III.) Stolzenberg

138A. Russian History: The Rise of the First Empire, 1500-1881 (4)
Lecture—3 hours; term paper. Prerequisite: courses 4B and 4C recommended. Expansion of the Russian state in Muscovite and imperial era. Emphasis on autocratic rule, the incorporation of non-Russian peoples, and emergence of Russia as a Great Power. Only two units of credit will be allowed to students who have completed former course 137B. GE credit: ArtHum, Wrt.—II. (II.)

138B. Russian History: The Russian Revolution, 1880-1917 (4)
Lecture—3 hours; term paper. Prerequisite: courses 4B and 4C recommended. History of the fall of the Russian Empire and of the Revolution of 1917. Not open for credit to students who have received credit for former course 138. GE credit: ArtHum, Wrt.—I. (I.)

138C. Russian History: The Rise and Fall of the Soviet Union, 1917 to the Present (4)
Lecture—3 hours; term paper. Prerequisite: courses 4B and 4C recommended. The emergence of the Soviet Union as a socialist system and a Great Power; the decline and collapse of the Soviet Union and the formation of independent nation states in its place. Not open for credit to students who have completed former course 137C. GE credit: ArtHum, Wrt.—III. (III.)

139A. Medieval and Renaissance Medicine (4)
Laboratory/discussion—3 hours; term paper. The history of medicine, circa 1000-1700. Revival of ancient medicine; role of the universities; development of anatomy, chemistry and natural history; ideas about the body; cultural understanding of disease; hospital and the public health system. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt.

139B. Medicine, Society, and Culture in Modern Europe (4)
Lecture—2 hours; discussion—1 hour; term paper. History of European medicine, 18th to 20th centuries, by examining the development of medical knowledge in epidemiology and anatomy; function of this knowledge, how it changed with technological breakthroughs and professionalization; and role of medicine in attitudes toward poverty, women, race, disease. Offered in alternate years. GE credit: ArtHum or SocSci, Wrt.—(III.) Kudlick

140. The Rise of Capitalism in Europe (4)
Lecture—3 hours; term paper. Prerequisite: course 4B or 4C. Comparative analysis of major interpretations of the rise of merchant capitalism during the Middle Ages and Renaissance; European expansion overseas, 1450-1815; the transition to modern capitalism via industrial revolution. Interplay of social, political, cultural, and economic history. Offered in alternate years. GE credit: SocSci.—III.

141. France Since 1815 (4)
Lecture—3 hours; term paper. GE credit: ArtHum, Wrt.—II. (II.)

142A. History of the Holocaust (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. Topics include comparative genocide, medieval and modern antisemitism, modern German history, the rise of Nazism, Jewish life in Europe before the Nazi period, and the fate of the Jewish communities and other persecuted groups in Europe from 1933-1945. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—I. Biale

142B. The Memory of the Holocaust (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. Examination of the literary, philosophical, theological and artistic responses to the Holocaust of the European Jews. Exploration of how memory is constructed, by whom and for what purposes. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—II. Biale

143. History of Eastern Europe and the Balkans (4)
Lecture—3 hours; essays. History of the Baltic, Danubian, and Balkan lands since the Middle Ages. National cultures and conflicts in the Polish Commonwealth and the Habsburg and Ottoman Empires; nationalist movements, 1789-1914; the twentieth century, including an analysis of the contemporary scene. GE credit: ArtHum, Div, Wrt.—II. (II.)

144A. History of Germany, 1450 to 1789 (4)
Lecture—3 hours; extensive writing. Survey of early modern Germany, 1450 to 1789, covering the theology and social history of the Reformation, the Peasants War of 1525, religious warfare, state building and absolutism, the rise of Prussia, Austro-Prussian dualism, and the German Enlightenment.—III. (III.) Stuart

144B. History of Germany since 1789 (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 144A recommended. History of the German lands in the age of the French Revolution; 19th-century liberalism, nationalism, and industrialization; the World Wars, National Socialism, and the Holocaust; east and west Germany in the Cold War; the post-reunification scene. (Not open for credit to students who have completed former course 144.) GE credit: ArtHum, Div, Wrt.—II. (II.)

145. War and Revolution in Europe, 1789-1918 (4)
Lecture—3 hours; term paper. Survey of revolutionary movements, international crises, and wars in Europe from the French Revolution to World War I. GE credit: ArtHum, Wrt.—III. (III.)

146A. Europe in the Twentieth Century (4)
Lecture—3 hours; term paper. Survey of the history of Europe from 1919 to 1939. GE credit: ArtHum, Wrt.—II. (II.) Dickinson

146B. Europe in the Twentieth Century (4)
Lecture—3 hours; term paper. Survey of the history of Europe since 1939. GE credit: ArtHum, Wrt.—III. (III.) Dickinson

147A. European Intellectual History, 1800-1870 (4)
Lecture—3 hours; term paper. European thought in the early industrial era. Shifting cultural frameworks, from romanticism to scientism; liberal and socialist reactions to social change. Focus on the work of Goethe, Hegel, J.S. Mill, Marx, Darwin and Flaubert. GE credit: ArtHum or SocSci, Wrt.—II. (II.) Saler

147B. European Intellectual History, 1870-1920 (4)
Lecture—3 hours; term paper. Cultural and intellectual watershed of the late nineteenth and early twentieth centuries. Emergence of modern art and literature; psychoanalysis and the new social sciences. Focus on the work of Baudelaire, Wagner, Nietzsche, Freud, Weber and Kafka. GE credit: ArtHum or SocSci, Wrt.—II. (II.) Saler

147C. European Intellectual History, 1920-1970 (4)
Lecture—3 hours; term paper. European thought and culture since World War I. Coverage includes: literature and politics; Communism and Western Marxism; Fascism; Existentialism; Structuralism; Feminism. Particular attention to Lenin, Brecht, Hitler, Sartre, Camus, Beckett, Marcuse, Foucault, Woolf and de Beauvoir. GE credit: ArtHum or SocSci, Div, Wrt.—III. (III.) Saler

148A. Women and Society in Europe: 1500-1789 (4)
Lecture—3 hours; term paper. Prerequisite: course 4B recommended. Roles and perceptions of women from the Renaissance to the French Revolution. Emphasis on social and economic factors as well as on discussions of women in the writings of political theorists and social commentators. GE credit: ArtHum, Div, Wrt.—II. (II.) Kudlick

148B. Women and Society in Europe: 1789-1920 (4)
Lecture—3 hours; term paper. Prerequisite: course 4C and 148A recommended. Roles and perceptions of women from the French Revolution to World War I, primarily in France and England. Emphasis on social and economic developments within a loosely chronological and comparative framework. GE credit: ArtHum, Div, Wrt.—II. (II.) Kudlick

148C. Women and Society in Europe: 1914-Present (4)
Lecture—3 hours; term paper. Prerequisite: course 148B recommended. The history of 20th-century Europe from the perspective of women and the family, and of sexual and gender relations. Emphasis on the impact on women of major events and movements, such as World War I, fascism, Soviet communism, World War II, the welfare state, feminism, and mass culture. GE credit: ArtHum, Div, Wrt.—III. (III.)

149. Comparative Cultural History of Modern Britain and France, 1880-1914 (4)
Lecture—3 hours; term paper. Cultural comparison of the histories of Britain and France during the fin de siecle. Addresses cultural debates of the period (including gender, race, class) and the practices of cultural history. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—II.

151A. England: The Middle Ages (4)
Lecture—3 hours; term paper. Prerequisite: course 4A recommended. Origins of England to the accession of the Lancastrians. Survey includes: impact of Norman Conquest on Anglo-Saxon institutions; rise of the Church, common law, parliament, and the economy; thought, arts, and literature to the age of Chaucer and Wyclif. GE credit: ArtHum, Wrt.—III. (III.)

151B. England: The Early Modern Centuries (4)
Lecture—3 hours; term paper. Prerequisite: courses 4A, 4B; course 151A recommended. From Lancaster and York to the Glorious Revolution. Includes growth of the Church of England; beginnings of modern worldwide economy; rise of the gentry and parliament; thought, arts, and literature in the times of More, Shakespeare, Hobbes, Wren, and Newton. GE credit: ArtHum, Wrt.

151C. Eighteenth-Century England (4)
Lecture—3 hours; term paper. English history from the Glorious Revolution to the French Revolution. Examination of the transformation of one of Europe's most politically unstable kingdoms into the firmly established constitutional monarchy which provided an environment fit to engender the industrial revolution. GE credit: ArtHum, Wrt.—I. (I.) Landau

151D. Industrial England (4)
Lecture—3 hours; term paper. English history from Waterloo to the Battle of Britain; the rise and continuance of the first industrial nation, examining the transformation of landed to class society, oligarchy to democracy and bureaucracy, Bentham to Bloomsbury, empire to commonwealth. GE credit: ArtHum, Div, Wrt.—Landau

159. Women and Gender in Latin American History (4)
Lecture—3 hours; extensive writing. Prerequisite: one course either on Latin America or in women's history in another world area. Roles of women and men in the history of Latin America, with an emphasis on the intersection of gender with racial and class categories. Introduction to the theoretical premises of women's and gender history. GE credit: ArtHum, Div, Wrt.—III. (III.) Langland

160. Spain and America in the 16th Century (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. The Atlantic world in the 16th century, particularly the transcultural and reciprocal social and economic relations between Spain and America in the course of colonization. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(III.) Harris

162. History of the Andean Region (4)
Lecture/discussion—3 hours; written and/or oral reports. History of the Andean region, the area that now comprises modern Peru, Bolivia, and Chile, from the beginning of human settlement to the present. GE credit: ArtHum, Div, Wrt.—III. (III.) C. Walker

163A. History of Brazil (4)
Lecture—3 hours; written reports. The history of colonial and imperial Brazil from 1500 to 1889. GE credit: ArtHum.—III.

163B. History of Brazil (4)
Lecture—3 hours; written reports. The history of the Brazilian republic from 1889 to the present. GE credit: ArtHum.—III.

164. History of Chile (4)
Lecture—3 hours; term paper. Prerequisite: course 161A, 161B, 165, or 168 recommended. Emphasis on the history of Chilean political economy from 1930 to the present. Various strategies of development (modernization, Marxism, Neo-Liberalism); the rise of mass politics; the course of foreign relations; and the richness of Chilean literature. Offered in alternate years. GE credit: ArtHum.—III.

165. Latin American Social Revolutions (4)
Lecture—3 hours; written reports. Major social upheavals since 1900 in selected Latin American nations; similarities and differences in cause, course, and consequence. GE credit: ArtHum.—II. (II.)

166A. History of Mexico to 1848 (4)
Lecture/discussion—3 hours; written and/or oral reports. Political, economic, and social development of pre-Columbian, colonial and national Mexico to 1848. GE credit: ArtHum.—(III.) Reséndez

166B. History of Mexico Since 1848 (4)
Lecture/discussion—3 hours; written and/or oral reports. History of Mexico from 1848 to the present. GE credit: ArtHum.—I. (I.) Reséndez

167. Modern Latin American Cultural and Intellectual History (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. Introduction to the cultural and intellectual history of modern Latin America including architecture, cinema, painting, music, and literature. GE credit: ArtHum, Wrt.—I. C. Walker, Reséndez

168. History of Inter-American Relations (4)
Lecture—3 hours; written reports. Diplomatic history of Latin America since independence, intra-Latin American relations, relations with the United States, participation in international organizations, and communism in Latin America. GE credit: ArtHum.—III. (III.)

169A. Mexican-American History (4)
Lecture/discussion—3 hours; written and/or oral reports. Economic, social, religious, cultural and political development of the Spanish-speaking population of the Southwestern United States from about 1800 to 1910. GE credit: ArtHum, Div, Wrt.—II. (II.) Oropeza

169B. Mexican-American History (4)
Lecture/discussion—3 hours; written and/or oral reports. Role of the Mexican and Mexican-American or Chicano in the economy, politics, religion, culture and society of the Southwestern United States since 1910. GE credit: ArtHum, Div, Wrt.—I. (I.) Oropeza

170A. Colonial America (4)
Lecture—3 hours; term paper. Colonial society from 1607 to the American Revolution, with emphasis on European expansion, political, social and economic foundations, colonial thought and culture, and imperial rivalry. GE credit: ArtHum, Div, Wrt.—Smolenski, Taylor

170B. The American Revolution (4)
Lecture—3 hours; term paper. Analysis of the Revolutionary epoch with emphasis on the structure of British colonial policy, the rise of revolutionary movements, the War for Independence and its consequences, and the Confederation period. GE credit: ArtHum, Div, Wrt.—Smolenski, Taylor

170C. The Early National Period, 1789-1815 (4)
Lecture—3 hours. Political and social history of the American republic from the adoption of the Constitution through the War of 1812 and its consequences. GE credit: ArtHum.—III. (III.)

171A. Jacksonian America (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. The political and social history of the United States from the end of the War of 1812 to the Compromise of 1850. How the market revolution transformed American life, and led the nation towards war. GE credit: ArtHum, Div, Wrt.—II. (II.) Kelman

171B. Civil War and Reconstruction (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. Examination of the political and social history of the United States from the Compromise of 1850 to the end of Reconstruction in 1876. Causes of the war, the war itself, and the problems of reconstruction after the war. GE credit: ArtHum, Div, Wrt.—III. (III.)

171BF. The Civil War in American Film (1)
Discussion—1 hour; film viewing. Prerequisite: course 171B concurrently. Viewing and discussion of films with short writing assignments. (P/NP grading only.)—II, III. (II, III.)

171D. Selected Themes in 19th Century American History (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. Interpretative overview of a single topic in the history of the United States in the 19th century. Sample topics include social history, the 1850s, and southern history. May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum, Wrt.—III.

172. American Environmental History (4)
Lecture—3 hours; term paper. Prerequisite: course 17A. Examination of changing relations between people and nature in the area of the current United States from pre-Columbian times to the present. Topics include ecological change; perceptions of nature; social conflicts over "proper" uses of nature; environmental movement. Offered in alternate years. GE credit: ArtHum, Wrt.—III. Warren

173. Becoming an American: Immigration and American Culture (4)
Lecture—3 hours; term paper. Prerequisite: course 17B or 72B recommended. An introduction to the wide range of immigrant experiences and cycles of nativism that have shaped American culture in the twentieth century. From novels, memoirs and films, students will explore how external and internal immigration has created a multicultural society. Offered alternate years. GE credit: ArtHum, Div, Wrt.—(III.) Tsu

174A. The Gilded Age and Progressive Era: United States, 1876-1917 (4)
Lecture—3 hours; term paper. Prerequisite: course 17B. U.S. history and the construction of modern America from the end of Reconstruction to U.S. entry into World War I. Includes Southern redemption, Western incorporation, electoral corruption, labor movements, Populism, Progressivism, women's suffrage, U.S. imperial expansion, and immigration restriction. Offered in alternate years. GE credit: ArtHum, Wrt.—I. Rauchway

174AD. Emergence of Modern America: Discussion (1)
Discussion—1 hour; short papers. Prerequisite: course 174A concurrently. Intensive discussion of topics and readings for course 174A. (P/NP grading only.)—I. (I.)

174B. War, Prosperity, and Depression: United States, 1917-1945 (4)
Lecture—3 hours; term paper. Prerequisite: course 17B. America's emergence as a world power, the business culture of the 1920s, the New Deal and World War II. Emphasis on such issues as government regulation of the economy, welfare capitalism, and class, racial, ethnic, and gender conflicts. Offered in alternate years. GE credit: ArtHum, Wrt.—II. Olmsted, Rauchway

174BD. America in War, Prosperity and Depression: Discussion (1)
Discussion—1 hour; short papers. Prerequisite: course 174B concurrently. Intensive discussion of topics and readings for course 174B. (P/NP grading only.)—II. (II.)

174C. The United States Since World War II, 1945 to the Present (4)
Lecture—3 hours; term paper. America's struggle to respond to new complexities in foreign relations, social tensions, family changes and media. Emphasis on such topics as: Cold War; anticommunist crusade; civil rights, feminist and environmentalist movement; New Left; counterculture; Vietnam; Watergate; and the moral majority. GE credit: ArtHum, Wrt.—III. (III.) Olmsted, Oropeza

174CD. The United States Since World War II: Discussion (1)
Discussion—1 hour; short papers. Prerequisite: course 174C concurrently. Intensive discussion of topics and readings for course 174C. (P/NP grading only.)—III. (III.)

174D. Selected Themes in 20th Century American History (4)
Lecture—3 hours; term paper. Prerequisite: course 17B or the equivalent. Interpretive overview of a single topic in the history of the United States in the 20th century with attention to the phases and processes of historical change. May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum.—(II.)

174DD. Selected Themes in 20th Century American History: Discussion (1)
Discussion—1 hour; short papers. Prerequisite: course 174D concurrently. Intensive discussion of topics and readings for course 174D. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

175. American Intellectual History (4)
Lecture—3 hours; term paper. Prerequisite: course 17B and upper division standing. Ideas that have shaped politics and society in the United States from colonial times to the present. Topics include American liberalism, republicanism, democracy, constitutionalism, communitarianism, utopianism, pragmatism, feminism, Darwinism, nationalism, conservatism, and economics. Offered in alternate years. GE credit: ArtHum, Wrt.—I. Rauchway

176A. Cultural and Social History of the United States (4)
Lecture—3 hours; term paper. Study of social and cultural forces in American society in the nineteenth century with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values. GE credit: ArtHum.—I. (I.)

176B. Cultural and Social History of the United States (4)
Lecture—3 hours; term paper. Study of social and cultural forces in American society in the twentieth century with emphasis on social structure, work and leisure, socialization and the family, social reform movements and changes in cultural values. GE credit: ArtHum.—III. (III.)

177A. History of Black People and American Race Relations, 1450-1860 (4)
Lecture—3 hours; term paper. History of black people in the United States from the African background to Reconstruction. GE credit: ArtHum or SocSci, Div, Wrt.—I. (I.) C.E. Walker

177B. History of Black People and American Race Relations, 1860-Present (4)
Lecture—3 hours; term paper. History of black people and race relations from 1860-present. Emphasis on Civil War, Reconstruction, Segregation, Age of Accommodation, black nationalism, urbanization, civil rights, and changing ideology of race relations. GE credit: ArtHum or SocSci, Div, Wrt.—II. (II.) Materson, C.E. Walker

178A. Race in America, 1492-1865 (4)
Lecture—4 hours. Prerequisite: course 17A or 17B or course 177A or 177B. Racial formation during the Age of Discovery, the Colonial Period, Early National and Antebellum periods up to the Civil War. Not open for credit to students who have completed course 178. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—III. C.E. Walker

178B. Race in America, 1865-Present (4)
Lecture—3 hours; term paper. Racial Formation in the Post Civil War. United States from 1860 to the present. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—II. C.E. Walker

179. Asian American History, 1850-Present (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing recommended. The historical experience of people of Asian ancestry in the United States from the mid-nineteenth century to the present. Migration, labor, community formation, race relations, women and gender, popular culture. GE Credit: Div, SocSci, Wrt.—Tsu

180AN. American Political History, 1789-1896 (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. Growth of American politics from the birth of the republic to the end of the nineteenth century. Development of political parties, the expanding electorate, and how social issues such as slavery shaped the political process. Not open for credit to students who have completed course 180A. Offered in alternate years. GE credit: ArtHum, Wrt.—II.

180BN. American Political History, 1896-present (4)
Lecture—3 hours; term paper. Prerequisite: course 17B. Politics in the United States from 1896 to the present. Topics include race and partisan politics; communism and anti-communism; the New Deal and the centralization of government; and the rise of the imperial presidency. Not open for credit to students who have completed course 180A or 180C. GE credit: ArtHum, Wrt.—III. (III.) Rauchway, Olmsted

181. Religion in American History to 1890 (4)
Lecture—3 hours; term paper. Prerequisite: course 17A. American religious history from colonization through the Gilded Age. Topics include religious diversity in America; native American religion; Protestant evangelism; gender and religion; religion and bigotry; African American religion; religion in the Civil War; and religion's response to modernization. Offered in alternate years. GE credit: ArtHum, Wrt.—III. Smolenski

183A. The Frontier Experience: Trans-Mississippi West (4)
Lecture—3 hours; written and/or oral reports. The fur trade, western exploration and transportation, the Oregon Country, the Greater Southwest and the Mexican War, the Mormons, mining discovery, and the West during the Civil War. GE credit: ArtHum, Div, Wrt.—I. (I.) Taylor

183B. The Frontier Experience: Trans-Mississippi West (4)
Lecture—3 hours; written and/or oral reports. Spread of the mining kingdom, the range cattle industry, Indian-military affairs, settlement of the Great Plains and Rocky Mountain Regions and political organization of the West. GE credit: ArtHum, Div, Wrt.—II. (II.) Warren

184. History of Sexuality in America (4)
Lecture—3 hours; extensive writing. History of sexuality in America from pre-European through the late twentieth century. Topics include birth control, marriage, sexual violence, prostitution, inter-racial relationships, heterosexuality and homosexuality, the feminist, gay, and lesbian liberation movements, AIDS, commercialization of sexuality. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—I. Materson

185A. History of Science in America (4)
Lecture—3 hours; research paper. Survey of the European background. Study of American scientific institutions, ideas, personalities, creative processes in science, and of relationships between society and science from colonial times to present. GE credit: ArtHum, Wrt.

185B. History of Technology in America (4)
Lecture—3 hours; research paper. Study of American technology, emphasizing biographical approach to historical understanding of technological change, creative processes, institutions, ideas, and relationships between technology and society from colonial times to present. GE credit: ArtHum, Wrt.

189. California History (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. California history from the precolonial period to the present including dispossession of California's Indians, political economy of the Spanish and Mexican periods, Gold Rush effects, industrialization, Hollywood, water politics, World War II, Proposition 13, and the emergence of the Silicon Valley. Not open for credit to students who have completed two courses of course 189A, 189B, 189C. GE credit: ArtHum, Wrt.—II. Warren, Tsu

190A. Middle Eastern History I: The Rise of Islam, 600-1000 (4)
Lecture—3 hours; extensive writing. Middle Eastern history from the rise of Islam to the disintegration of the Abbasid Caliphate; the formative centuries of a civilization. Politics and religion, conquest and conversion, arts and sciences, Christians, Jews and Muslims, gender and sexuality, orthodoxy and heterodoxy. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—(I.) Tezcan

190B. Middle Eastern History II: The Age of the Crusades, 1001-1400 (4)
Lecture—3 hours; extensive writing. Middle Eastern history during the age of the Crusades and Mongol invasions. The idea of holy war, the Crusades, the Mongols as the bearers of Chinese arts, nomads and sedentary life, feudalism, mysticism, slavery, women in the medieval Middle East. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—(I.) Tezcan

190C. Middle Eastern History III: The Ottomans, 1401-1730 (4)
Lecture—3 hours; extensive writing. Middle Eastern history from the foundation of the Ottoman Empire on the borderlands of Byzantine Anatolia through its expansion into Europe, Asia, and Africa, creating a new cultural synthesis including the Arab, Greek, Islamic, Mongol, Persian, Slavic, and Turkish traditions. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—(II.) Tezcan

190D. Middle Eastern History IV: Safavids Iran, 1300-1720 (4)
Lecture—3 hours; term paper. Middle Eastern history focusing on Safavid Empire (present-day Iran, Iraq, Afghanistan, up to Georgia), beginning with the origins of the dynasty as a powerful religious family, to the establishment of the Empire, focusing on Social, Religious, Economic, and Political History. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—II. Anooshahr

191A. Classical China (4)
Lecture—3 hours; term paper. History of Chinese civilization from its origins through the establishment of city states and the flowering of classical philosophy, to the rise and fall of the First Empire. GE credit: ArtHum, Div, Wrt.—I, II. (I, II.)

191B. High Imperial China (4)
Lecture—3 hours; term paper. Political disunion and the influx of Buddhism; reunification under the great dynasties of T'ang, Sung, and Ming with analysis of society, culture and thought. GE credit: ArtHum, Div, Wrt.—II. (II.) Bossler

191C. Late Imperial China (4)
Lecture—2 hours; discussion—1 hour; two long papers. Prerequisite: course 9A or upper division standing. Patterns and problems of Chinese life traced through the Ming and Ch'ing dynasties (c. 1500–1800), prior to the confrontation with the West in the Opium War. Readings include primary sources and novels portraying elite ethos as well as popular culture. GE credit: ArtHum, Div, Wrt.—I.

191D. Nineteenth Century China: The Empire Confronts the West (4)
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9A, or upper division standing. The decline and fall of the Chinese Empire, with particular attention to the social and political crises of the 19th century, and the response of government officials, intellectuals, and ordinary people to the increasing pressures of Western imperialism. GE credit: ArtHum, Div, Wrt.—I. (I.) Bossler

191E. The Chinese Revolution (4)
Lecture—2 hours; discussion—1 hour; extensive writing. Prerequisite: upper division standing. Analysis of China's cultural and political transformation from Confucian empire into Communist state. Emphasis on emergence and triumph of peasant revolutionary strategy (to 1949), with some attention to its implications for post-revolutionary culture and politics. GE credit: ArtHum, Div, Wrt.—II. (II.)

191F. History of the People's Republic of China (4)
Lecture—2 hours; discussion—1 hour; extensive writing. Prerequisite: upper division standing. Comprehensive analysis of recent Chinese history, including land reform, the Cultural Revolution, the post-Mao era, and the consequences of the new economic policies of the 1980s. Not open for credit to students who have completed course 190C. GE credit: ArtHum, Div, Wrt.—(III.)

192. Internship in History (1-12)
Prerequisite: enrollment dependent on availability of intern positions, with priority to History majors. Supervised internship and study as historian, archivist, curator, or in another history-related capacity, in an approved organization or institution. (P/NP grading only.)

193A. History of the Modern Middle East, 1750-1914 (4)
Lecture—3 hours; term paper. Prerequisite: course 6 recommended. Transformation of state and society within the Middle East from 1750 to 1914 under pressure of the changing world economy and European imperialism. Themes include colonialism, Orientalism, Arab intellectual renaissance, Islamic reform, state-formation, role of subaltern groups. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—II. El Shakry

193B. History of the Modern Middle East from 1914 (4)
Lecture—3 hours; term paper. Prerequisite: course 6 recommended. The Middle East from the turn of the 20th century to the present. Themes include the legacy of imperialism, cultural renaissance, the World Wars, nationalism, Palestine/Israel, Islamic revival, gender, revolutionary movements, politics of oil and war, cultural modernism, exile and diaspora. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—III. El Shakry

193C. Environment and Development in the Middle East (4)
Lecture/discussion—3 hours; project. Prerequisite: upper division standing recommended. Examines Middle East environment and human use of nature over last 10,000 years. Discussion of colonial and contemporary environment and development planning and politics. Case studies include Egypt, the

Maghreb, Palestine/Israel on rivers, desertification, national parks indigenous knowledge, etc. GE Credit: ArtHum, SocSci.—II. (II.) Davis

194A. Aristocratic and Feudal Japan (4)
Lecture—3 hours; term paper and/or discussion. Broad survey of the cultural, social, religious, and political aspects of Japanese history from mythological times through the sixteenth century emphasizing comparison of the organizations, values, and beliefs associated with the aristocratic and feudal periods. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(II.)

194B. Early Modern Japan (4)
Lecture—3 hours; term paper and/or discussion. Survey of the cultural, social, economic, and political aspects of Japanese history from the seventeenth through the nineteenth centuries emphasizing the development of those patterns of thought and political organization with which Japan met the challenge of the nineteenth-century Western expansionism. GE credit: ArtHum, Div.—I. (I.) Kim

194C. Modern Japan (4)
Lecture—3 hours; term paper and/or discussion. Survey of the cultural, social, economic, and political aspects of Japanese history in the twentieth century emphasizing labor and social movements, militarism and the Pacific war, and the emergence of Japan as a major economic power. GE credit: ArtHum, Div.—III. (III.) Kim

194D. Business and Labor in Modern Japan (4)
Lecture—3 hours; term paper or papers. Survey of labor and management relations in Japan from the mid-eighteenth century to the present. Offered in alternate years. GE credit: ArtHum.—I.

194E. Education and Technology in Modern Japan (4)
Lecture—3 hours; term papers. Survey of education and technology in Japan from the mid-eighteenth century to the present. Offered in alternate years. GE credit: ArtHum.—I.

195B. History of Modern Korea (4)
Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: upper division standing. History of Modern Korea, from Yi dynasty period to 1990s. Political and socioeconomic changes in 19th century, modernization under Japanese colonialism, postwar economic growth and effects of the Cold War. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—II. Kim

196A. Medieval India (4)
Lecture—3 hours; discussion—1 hour; written reports. Survey of history of India in the millennium preceding arrival of British in the eighteenth century, focusing on interaction of the civilizations of Hinduism and Islam and on the changing nature of the state. GE credit: ArtHum, Div, Wrt.—I. (I.) Sen

196B. Modern India (4)
Lecture—3 hours; discussion—1 hour; written reports. Survey of cultural, social, economic, and political aspects of South Asian history from arrival of the British in the eighteenth century to formation of new independent states—India, Bangladesh, and Pakistan—in the twentieth century. GE credit: SocSci, Div, Wrt.—Sen

197T. Tutoring in History (2)
Discussion—1 hour; laboratory—3 hours. Prerequisite: enrolled as a History major with senior standing and consent of department chairperson. Tutoring of students in lower division courses. Weekly meeting with instructors in charge of courses. Written reports on methods and materials required. May be repeated one time for credit. No final examination. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor; upper division standing. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201A-L, N, P-Q, S-T, W, X. Sources and General Literature of History (4)
Seminar—3 hours; term paper. Prerequisite: consent on instructor. Designed primarily for students preparing for higher degrees in history. (A) Ancient; (B) Medieval; (C) Renaissance and Reformation; (D) Early Modern Europe; (E) Europe since 1815; (F) China to 1880; (G) China since 1880; (H) Britain; (I) Latin America since 1810; (J) American History to 1787; (K) United States, 1787-1896 (L) United States since 1896; (N) Modern Japan; (P) African Historiography; (Q) Cross-Cultural Women's History; (S) History of Science and Medicine; (T) Jewish History; (W) Sources and General Literature of History; (X) World History. May be repeated for credit when different subject area is studied.

202A-I. Major Issues in Historical Interpretation (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. (A) Ancient; (B) Medieval Europe; (C) Modern Europe; (D) India; (E) Africa; (F) China; (G) Japan; (H) United States; (I) Latin America. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied.—I, II, III. (I, II, III.)

203A. Research Seminar (4)
Seminar—3 hours; tutorial—1 hour. Designed for students preparing for higher degrees in history. Individual research and analysis resulting in substantial research paper of publishable quality. Completion required of all Ph.D. candidates. The three courses must be taken in continuous sequence, ordinarily during second year.—I. McKee

203B-203C. Research Seminar (4-4)
Seminar—3 hours; tutorial—1 hour. Prerequisite: course 203A. Designed for students preparing for higher degrees in history. Individual research and analysis resulting in substantial research paper of publishable quality. Completion required of all Ph.D. candidates. The three courses must be taken in continuous sequence, ordinarily during second year. (Deferred grading only, pending completion of sequence.)—II, III. McKee

204. Historiography (4)
Seminar—3 hours; term paper. Major issues in the philosophy and methodology of history.—I. (I.)

221. Medieval History (4)
Seminar—3 hours. Prerequisite: courses 121A, 121B, 121C recommended. Topics in the history of medieval and early Renaissance Europe.

245. Modern European History (4)
Seminar—3 hours. Prerequisite: course 201E. Primary sources and research methodologies in the history of modern France and Germany. May be repeated one time for credit.—III. (III.)

261. Latin American History (4)
Seminar—3 hours. Prerequisite: two courses in Latin American history; reading knowledge of Spanish or Portuguese.—I, II, III. (I, II, III.)

271A-271B. United States History (4-4)
Seminar—3 hours; term paper. Prerequisite: course 201J-L or 202H. Research in literature, methods, and sources on aspects of United States history, culminating in each student completing a research paper in the field by the end of the second quarter. May be repeated for credit. (Deferred grading only, pending completion of sequence.)—II-III. (II-III.)

291A. Chinese History (4)
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Research on topics to be chosen by the students for the purpose of writing article-length papers. May be repeated for credit. (Deferred grading only, pending completion of sequence.)—Bossler

291B. Chinese History (4)
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Completion of article-length papers on topics chosen by students. May be repeated for credit. (Deferred grading only, pending completion of sequence.)—Bossler

291C. Methods and Issues in Chinese History (4)
Seminar—2 hours; tutorial—1 hour. Prerequisite: reading knowledge of Chinese; consent of instructor. Readings in Chinese historical materials. Training in the use of Chinese reference works (including on-line resources). May be repeated for credit.—I. (I.) Bossler

292. College Teaching Internship (4)
Internship—4 hours. Prerequisite: course 300 (may be taken concurrently). Student prepares and teaches one lower division history course in a nearby community college under the supervision of a UC Davis instructor and a community college instructor. (S/U grading only.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

299D. Individual Study (1-12)
(S/U grading only.)

Professional Courses

389. Introductory Seminar for Teaching Assistants (1)
Seminar—1 hour. Prerequisite: must be enrolled in course 390. An introduction to the broad comparative and theoretical issues of teaching methods and techniques in history. (S/U grading only.)—I, II, III. (I, II, III.)

390. Teaching History in College (2)
Discussion—2 hours. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of lower division classes at the university. (S/U grading only.)—I, II, III. (I, II, III.)

History and Philosophy of Science

(College of Letters and Science)

Joseph Dumit, Ph.D., Program Director

Program Office. 1241 Social Sciences and Humanities Building
(530) 752-0703

Committee in Charge

Thomas Beamish, Ph.D. *(Sociology)*
Patrick Carroll, Ph.D. *(Sociology)*
Timothy Choy, Ph.D. *(Anthropology, Science and Technology Studies)*
Carolyn de la Pena, Ph.D. *(American Studies)*
Joseph Dumit, Ph.D. *(Anthropology, Science and Technology Studies)*
James Griesemer, Ph.D. *(Philosophy)*
Caren Kaplan, Ph.D. *(Women and Gender Studies)*
Roberta Millstein, Ph.D. *(Philosophy)*
Colin Milburn, Ph.D. *(English)*
Daniel Stolzenberg, Ph.D. *(History)*
Madhavi Sunder, J.D. *(School of Law)*

Minor Program Requirements:

The interdisciplinary minor in the history and philosophy of science invites students to examine historical and contemporary problems in a variety of scientific disciplines, and to explore concepts and procedures basic to science and how they have evolved. The minor is sponsored by the Program in Science and Technology Studies.

	UNITS
History and Philosophy of Science 24	
Philosophy 30	4
Five courses from those listed below. One course must be from each of three areas: (a)	

history, (b) philosophy, and (c) science and technology studies..... 20
(a) History 102, 135A, 135B, 136, 139A, 139B, 185A, 185B, 188A, 188B;
(b) Philosophy 106, 107, 108, 109, 110, 111;
(c) Science and Technology Studies 20, 130A, 130B, 131, 150, 180.

Minor Adviser. P. Carroll in 2272 Social Sciences and Humanities Building (530) 752-5388.

Honors Challenge

Lolita Nelson-Adkins, Program Manager

Program Office. 1350 Surge III
(530) 752-9797; *http://www.dhc.ucdavis.edu*

The Program of Study

The Davis Honors Challenge (DHC) is a program for highly motivated students interested in enhancing their education through special courses, closer contact with faculty, and dynamic interaction with academic peers. Interested students apply in the spring quarter for places the following year. First-year students participating in the DHC take one honors course, one orientation seminar and one DHC freshman seminar. Second-year students take one problem oriented interdisciplinary seminar and have the option to substitute an honors contract or a DHC Freshman Seminar for an honors course. Third-year students are required to complete two honors contracts and one upper division honors seminar. Fourth-year students participate in a year-long team project. Transfer students complete a transfer orientation seminar and two honors contracts. They are also required to meet with an honors counselor to help determine their program pathway. All students who successfully complete the program receive transcript notation for each year of participation.

Lower division departmental Honors courses, special DHC sections of regular courses, DHC seminars, and special studies opportunities constitute the course offerings of the Davis Honors Challenge. A complete list of these courses, with course registration numbers, is made available to admitted students through the Davis Honors Challenge office.

Lower division seminars are offered each year during winter and spring quarters. The seminars are designed to foster critical thinking and analytic interpretation, improve oral and written and technical communication skills, enhance research skills, and provide experience with group dynamics and collaborative exploration of problems. Enrollment in each seminar is limited to 20 students. Updated program information is available at our website.

Students not admitted to the program may not register for Davis Honors Challenge sections, seminars, or special study opportunities.

Courses in Davis Honors Challenge (HNR)

Lower Division Courses

90X. Honors Discussion Section (1)
Discussion—1 hour. Prerequisite: open only to students in the Davis Honors Challenge. Examination of special topics in selected lower division courses through additional readings, discussions, term papers, collaborative work, or special activities, including projects, field and laboratory experiences, computer simulations, creative works. May be repeated for credit.

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: open only to students in the Davis Honors Challenge. Supervised work experience under the auspices of the Davis Honors Challenge. May be repeated for credit for a total of 12 units. (P/NP grading only.)

94. Honors Seminar (4)
Seminar—4 hours. Prerequisite: open only to students in the Davis Honors Challenge. Collaborative, multidisciplinary exploration of complex contemporary problem. Focus on critical thinking and analytical interpretation, on oral and written communication, and on the use of electronic media in gathering information. May be repeated for credit. GE credit: Wrt.

98. Directed Group Study (1-5)
Discussion—1-5 hours. Prerequisite: open only to students in the Davis Honors Challenge. May be repeated for credit. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Independent study—1-5 hours. Prerequisite: student in the Davis Honors Challenge. (P/NP grading only.)

Upper Division Courses

190X. Honors Contract (1)
Independent study or discussion—3 hours. Prerequisite: open only to students in the Davis Honors Challenge. In-depth examination of material in an upper division course as defined in an Honors Contract Proposal submitted by the student. Contract must be approved by the instructor and the Honors Council of the Academic Senate. May be repeated for credit.

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: open only to students in the Davis Honors Challenge. Supervised work experience under the auspices of the Davis Honors Challenge. May be repeated for credit for a total of 12 units. (P/NP grading only.)

194. Honors Seminar (3)
Seminar—3 hours. Open only to students in the Davis Honors Challenge. Team-based work on actual problems drawn from the public or private sector. Focus on critical thinking and analytical interpretation, oral and written communication skills, and development of practical solutions to real-world problems. GE credit: Wrt.—II, III. (II, III.)

195. Honors Thesis/Honors Project (1-3)
Independent Study—3-9 hours. Prerequisite: Open only to students in the Davis Honors Challenge. Guided independent study of a selected topic leading to the presentation of an honors thesis/honors project. May be repeated for credit up to 9 units.

198. Directed Group Study (1-5)
Discussion—1-5 hours. Prerequisite: open only to students in the Davis Honors Challenge. May be repeated for credit. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Independent study—1-5 hours. Prerequisite: open only to students in the Davis Honors Challenge. May be repeated for credit. (P/NP grading only.)

Horticulture and Agronomy (A Graduate Group)

M. Andrew Walker, Ph.D., Chairperson of the Group

Group Office. 1224 Plant and Environmental Sciences Building
(530) 752-7738; *http://ggha.ucdavis.edu*

Faculty

Douglas O. Adams, Ph.D., Associate Professor *(Viticulture and Enology)*
Diane M. Beckles, Ph.D., Assistant Professor *(Plant Sciences)*
Alison M. Berry, Ph.D., Professor *(Plant Sciences)*
Arnold J. Bloom, Ph.D., Professor *(Plant Sciences)*
Eduardo Blumwald, Ph.D., Professor *(Plant Sciences)*
Kent J. Bradford, Ph.D., Professor *(Plant Sciences)*
Patrick H. Brown, Ph.D., Professor *(Plant Sciences)*
David W. Burger, Ph.D., Professor *(Plant Sciences)*
Abhaya M. Dandekar, Ph.D., Professor *(Plant Sciences)*
Theodore M. DeJong, Ph.D., Professor *(Plant Sciences)*
Jorge Dubcovsky, Ph.D., Professor *(Plant Sciences)*
Don J. Durzan, Ph.D., Professor *(Plant Sciences)*
Jan Dvorak, Ph.D., Professor *(Plant Sciences)*
Valerie T. Eviner, Ph.D., Assistant Professor *(Plant Sciences)*
Albert J. Fischer, Ph.D., Associate Professor *(Plant Sciences)*
Mark Francis, M.L.A., Professor *(Landscape Architecture)*
Shu Geng, Ph.D., Professor *(Plant Sciences)*
Paul L. Gepts, Ph.D., Professor *(Plant Sciences)*
Thomas M. Gradziel, Ph.D., Professor *(Plant Sciences)*
James A. Harding, Ph.D., Professor *(Plant Sciences)*
William Horwath, Ph.D., Professor *(Land, Air and Water Resources)*
Kentaro Inoue, Ph.D., Associate Professor *(Plant Sciences)*
Louise E. Jackson, Ph.D., Professor *(Land, Air and Water Resources)*
Marie A. Jasieniuk, Ph.D., Associate Professor *(Plant Sciences)*
Judy Jernstedt, Ph.D., Professor *(Plant Sciences)*
John M. Labavitch, Ph.D., Professor *(Plant Sciences)*
Emilio A. Laca, Ph.D., Professor *(Plant Sciences)*
J. Heinrich Lieth, Ph.D., Professor *(Plant Sciences)*
James D. MacDonald, Ph.D., Professor *(Plant Pathology)*
Mark A. Matthews, Ph.D., Professor *(Viticulture and Enology)*
Richard W. Michelmore, Ph.D., Professor *(Plant Sciences)*
David B. Neale, Ph.D., Professor *(Plant Sciences)*
Donald J. Nevins, Ph.D., Professor *(Plant Sciences)*
Michael P. Parrella, Ph.D., Professor *(Entomology)*
Donald A. Phillips, Ph.D., Professor *(Plant Sciences)*
Richard E. Plant, Ph.D., Professor *(Plant Sciences)*
Vito S. Polito, Ph.D., Professor *(Plant Sciences)*
Daniel Potter, Ph.D., Professor *(Plant Sciences)*
Carlos F. Quiros, Ph.D., Professor *(Plant Sciences)*
Michael S. Reid, Ph.D., Professor *(Plant Sciences)*
Jeffrey S. Ross-Ibarra, Ph.D., Assistant Professor *(Plant Sciences)*
Kate M. Scow, Ph.D., Professor *(Land, Air and Water Resources)*
Kenneth A. Shackel, Ph.D., Professor *(Plant Sciences)*
Douglas V. Shaw, Ph.D., Professor *(Plant Sciences)*
Johan W. Six, Ph.D., Professor *(Plant Sciences)*
David R. Smart, Ph.D., Associate Professor *(Viticulture and Enology)*
Dina St. Clair, Ph.D., Professor *(Plant Sciences)*
Larry R. Teuber, Ph.D., Professor *(Plant Sciences)*
Li Tian, Ph.D., Assistant Professor *(Plant Sciences)*
Chris van Kessel, Ph.D., Professor *(Plant Sciences)*
M. Andrew Walker, Ph.D., Professor *(Viticulture and Enology)*
Larry E. Williams, Ph.D., Professor *(Viticulture and Enology)*
John I. Yoder, Ph.D., Professor *(Plant Sciences)*
Truman P. Young, Ph.D., Professor *(Plant Sciences)*
Florence Zakharov, Ph.D., Assistant Professor *(Plant Sciences)*

Affiliated Faculty

Lars W. J. Anderson, Ph.D., Research Leader, USDA *(Plant Sciences)*
Kendra Baumgartner, Ph.D., Lecturer and Research Plant Pathologist *(Plant Pathology)*
Marita Cantwell, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Roger T. Chetelat, Ph.D., Lecturer and Agronomist *(Plant Sciences)*
Carlos H. Crisosto, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Joseph M. DiTomaso, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Richard Y. Evans, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Steven A. Fennimore, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Louise Ferguson, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*

Matthew W. Fidelibus, Ph.D., Extension Viticulturist *(Viticulture & Enology)*
W. Douglas Gubler, Ph.D., Lecturer and Extension Plant Pathologist *(Plant Pathology)*
Timothy K. Hartz, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
James E. Hill, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
R. Scott Johnson, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Stephen R. Kaffka, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Bruce D. Lampinen, Ph.D., Associate Specialist in Cooperative Extension *(Plant Sciences)*
W. Thomas Lanini, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Andrew J. McElrone, Ph.D., Research Plant Physiologist *(Viticulture and Enology)*
E. Greg McPherson, Ph.D., Lecturer *(Plant Sciences)*
Elizabeth J. Mitcham, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Jeffrey P. Mitchell, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Lorence R. Oki, Ph.D., Lecturer and Associate Specialist in Cooperative Extension *(Plant Sciences)*
Dan E. Parfitt, Ph.D., Lecturer and Pomologist *(Plant Sciences)*
G. Stuart Pettygrove, Ph.D., Soils Specialist *(Land, Air and Water Resources)*
Daniel H. Putnam, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Kerri L. Steenwerth, Ph.D., Assistant Adjunct Professor (Viticulture and Enology)
Trevor V. Suslow, Ph.D., Lecturer and Specialist in Cooperative Extension *(Plant Sciences)*
Kenneth W. Tate, Ph.D., Lecturer and Rangeland Specialist *(Plant Sciences)*
Steve R. Temple, Ph.D., Lecturer and Extension Agronomist *(Plant Sciences)*
Allen E. Van Deynze, Ph.D., Biotechnology Specialist *(Plant Sciences)*
Mark Van Horn, M.S., Lecturer *(Plant Sciences)*
James A. Wolpert, Ph.D., Cooperative Extension Specialist *(Viticulture and Enology)*

Graduate Study. The Graduate Group in Horticulture and Agronomy offers programs of study leading to the M.S. and Ph.D. degrees for students interested in the science and management of agricultural crops, including their ecology, physiology, genetics, and post-harvest management, as well as the interaction of agricultural crops with the environment. These programs are designed to focus on a cropping system, such as agronomy, environmental horticulture, pomology, vegetable crops, viticulture and weed science. Within that cropping system, the student can specialize in one of a number of areas, including agroecology, biotechnology, breeding and crop improvement, crop physiology, crop production, floriculture, landscape horticulture, mineral nutrition, modeling, nursery production, pest management, plant growth and development, postharvest physiology, revegetation/restoration, and water relations. Research may be conducted within these areas with an applied or basic focus, but in association with a cropping system.

Preparation. For both the M.S. and Ph.D. programs, a level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes coursework in general biology, chemistry, organic chemistry, physics, statistics, genetics, introductory plant physiology, and soil science. A few limited deficiencies in any of these areas can be made up after admission to the graduate program. Specific requirements are outlined in detail on the group's website. The graduate adviser, the major professor, and the student will design a program of advanced courses to meet individual academic needs within one of the specializations.

Graduate Advisers. Consult the Group office.

Courses in Horticulture (HRT)

Graduate Courses

203. Research Perspectives in Horticulture (3)
Lecture—1 hour; lecture/discussion—2 hours. Prerequisite: Plant Biology 111 and 112, or Environmental Horticulture 102 or the equivalent. Following lectures/discussions of scientific methodology, students develop research proposals aided by classroom discussions and individual interactions with instructors. Lectures and critiques of "classical papers" provide a sense of the evolution of the current concepts in perennial plant biology. Offered in alternate years.—II. (II.) DeJong, van Kessel

251. Modeling Horticultural Systems (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Sciences 142, calculus, or consent of instructor. Development and application of models. Emphasis on physiological and ecological models, with examples from areas of interest to class participants. Applications to horticultural systems.—II. (II.) Lieth

290. Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing at UCD. Seminars presented by invited speakers, students, or faculty on selected topics in horticulture. (S/U grading only.)—III. (III.)

298. Group Study (1-5)

Human Anatomy

See Courses in Cell Biology and Human Anatomy (CHA), on page 390.

Human and Community Development

(College of Agricultural and Environmental Sciences)

Zhe Chen, Ph.D., Chairperson of the Department

Luis E. Guarnizo, Ph.D., Associate Chairperson of the Department

Community Studies and Development, Human Development and Family Studies, and International Agricultural Development.

Department Advising Office. 1303 Hart Hall (530) 752-2244, 752-1805; *http://hcd.ucdavis.edu*

Faculty—Community Studies and Development

Christopher Benner, Ph.D., Associate Professor
Ryan Galt, Ph.D., Assistant Professor
Luis E. Guarnizo, Ph.D., Professor
Frank Hirtz, Ph.D., Associate Professor
Martin F. Kenney, Ph.D., Professor
William Lacy, Ph.D., Professor
Jonathan London, Ph.D., Assistant Professor
Michael P. Smith, Ph.D., Professor
Thomas Tomich, Ph.D., Professor

Emeriti Faculty

Stephen Brush, Ph.D. Professor Emeritus
Isao Fujimoto, Ph.D., Lecturer SOE Emeritus
James I. Grieshop, Ph.D., Specialist in Cooperative Extension Emeritus
Miriam Wells, Ph.D., Professor Emerita
Alvin D. Sokolow, Ph.D., Specialist in Cooperative Extension Emeritus
Janet Momsen, Ph.D. Professor Emerita
Distinguished Graduate Mentoring Award
Joan Wright, Ph.D., Specialist in Cooperative Extension Emerita

Affiliated Faculty

David Campbell, Ph.D., Associate Specialist in Extension
Laurie Lippin, Ph.D., Continuing Appointment Lecturer
Bernadette Tarallo, Ph.D., Continuing Appointment Lecturer
Paul Marcotte, Ph.D., Continuing Appointment Lecturer
Robert Wiener, Ph.D., Continuing Appointment Lecturer

Faculty—Human Development and Family Studies

Brenda K. Bryant, Ph.D., Professor
Zhe Chen, Ph.D., Professor
Katherine Conger, Ph.D., Associate Professor
Rand Conger, Ph.D., Professor
Amanda Guyer, Ph.D., Assistant Professor
Lawrence V. Harper, Ph.D., Professor
Rosemarie Kraft, Ph.D., Lecturer SOE
Lisa Miller, Ph.D., Associate Professor
Adrienne Nishina, Ph.D., Assistant Professor
Beth A. Ober, Ph.D., Professor

Emeriti Faculty

Keith Barton, Ph.D., Professor Emeritus
Richard Ponzio, Ph.D., Extension Specialist Emeritus
Emmy E. Werner, Ph.D., Extension Specialist Emerita

Affiliated Faculty

Jennifer Gonzales, Child Development Demonstration Lecturer
Julia Luckenbill, Child Development Demonstration Lecturer
Ann Mastergeorge, Ph.D., Assistant Adjunct Professor/Assistant Researcher
Lenna Ontai Ph.D., Associate Extension Specialist
Kelly Twibell, Child Development Demonstration Lecturer

Faculty—International Agricultural Development

Faculty includes members from various departments across colleges.

Major Programs. See Community and Regional Development, on page 198, Human Development, on page 334, and International Agricultural Development (A Graduate Group), on page 346.

Human Development

(College of Agricultural and Environmental Sciences)

Faculty. See Department of Human and Community Development, on page 334.

The Major Program

Human development explores the developmental process in humans throughout the life cycle. Biological, cognitive, and personality/sociocultural aspects of development are studied.

The Program. Human development majors complete a group of preparatory courses in anthropology, general biology, genetics, history, philosophy, physiology, psychology, and statistics. Upper division students can design their programs in consultation with a faculty member to emphasize a particular interest. For instance, students can study the cognitive, social, and biological aspects of human development while emphasizing child or adult development.

Internships and Career Alternatives. At least one practicum course is required. A second practicum or supervised internship can be used to fulfill the restricted elective requirement for the major. In addition, students can intern in schools, early childhood education or senior centers, hospitals, rehabilitation centers, probation offices, group foster homes, mental health clinics, or as tutors for handicapped or bilingual students. Human development graduates fill a wide variety of positions in preschools, elemen-

tary and special educational settings, programs designed for parents, families, and the elderly, as well as governmental jobs related to social services for people of all ages. Students who emphasize biological aspects of human development can apply to medical school or pursue training for positions in the health sciences. Human development prepares students to pursue advanced degrees in behavioral and social sciences, education, social work, family law, or health sciences.

Preparatory Requirements. UC Davis students who wish to change their major to Human Development must complete the following courses with a combined grade point average of at least 2.500. All of the following courses must be taken for a letter grade:

Psychology 1
Statistics 10 or 13 or Psychology 41 or Sociology 46A and 46B
One course from Anthropology 1, 2 or 15
One course from Biological Sciences 2A, 10, 101; Microbiology 10; Molecular and Cellular Biology 10; or Neurobiology, Physiology, and Behavior 10, 12 or 101

B.S. Major Requirements:

UNITS

Preparatory Subject Matter..... 39-46

Two courses from: Anthropology 1, 2, or 15..... 8-9
One course from: Biological Sciences 2A, 10, Microbiology 10, or Neurobiology, Physiology, and Behavior 12..... 3-4
One course from: Molecular and Cellular Biology 10 or Biological Sciences 101†... 4
One course from: History 17A, 17B, 72A, 72B, or Political Science 1..... 4
Two courses from Philosophy 5, 30, 31, 32, or 38..... 8
One course from: Neurobiology, Physiology, and Behavior 10, 101, or Psychology 101..... 4-5
Psychology 1..... 4
One course from: Psychology 41 or Sociology 46A and 46B, or Statistics 10 or 13..... 4-8

Depth Subject Matter 50-55

Life Span: Human Development 100A, 100B, 100C 12
Research Methods: Human Development 120..... 4

At least one of the courses from the Depth Subject groups listed below must focus on childhood/adolescence (101, 102, 103, 110, 130, 132) and one on adulthood/aging (117, 143, 160, 161, 162, 163).

Biological Processes: one course from: Biological Sciences 101†, Human Development 117, Nutrition 111AV, or Psychology 121..... 3-5
Social-Cultural Processes: one course from Human Development 102, 110, 130, 160, or 162..... 4
Cognitive Processes: one course from Human Development 101, 103, 132, 161 or 163..... 4
Practicum. one course from Human Development 140-140L, or 141 or 142 or 143..... 4-6

Restricted Electives..... 19-20

Five additional upper division courses chosen from among Human Development courses or from a list of restricted electives in consultation with faculty adviser. May include only one practicum course.

English Composition Requirement 4

In addition to the College English Composition requirements, choose one from University Writing Program 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 102H, 104A, 104B, 104C, 104D, 104E, 104F..... 4

Total Units for the Major 93-10

† Biological Sciences 101 cannot be used to satisfy both the Preparatory Subject Matter and the Depth Subject Matter Requirements.

Major Adviser. L. Harper

Minor Program Requirements:

The Department of Human and Community Development offers two minors.

UNITS

Aging and Adult Development 21-26

Human Development 100C, 117, 143, 160, 161, 162, or 163 15-18
Select two courses from the following: Human Development 110; Community and Regional Development 173; Psychology 121, 123, 126, 155; Sociology 127 6-8

Minor Adviser. L. Miller, B. Ober

UNITS

Human Development 20

Human Development 100A and 100B..... 8
Human Development 100C or 110..... 4
Two courses from Human Development 101, 102, 103, 130, 132, 161 or 163 .. 8

Minor Adviser. L. Harper, R. Kraft

Graduate Study. Graduate study is available through a Master of Science degree in child development, and a Ph.D. degree in human development. See Child Development (A Graduate Group), on page 191, and Human Development (A Graduate Group), on page 337. See also Graduate Studies, on page 109.

Courses in Human Development (HDE)

Questions pertaining to the following courses should be directed to the instructor or to the Human and Community Development Advising office in 1303 Hart Hall (530) 752-2244.

Lower Division Courses

12. Human Sexuality (3)
Lecture—3 hours. Vocabulary, structure/function of reproductive system; sexual response; pre-natal development; pregnancy and childbirth; development of sexuality; rape and sexual assault; birth control; sexually transmitted diseases; homosexuality; establishing/maintaining intimacy; sexual dysfunctions; communication; enhancing sexual interaction, cultural differences in attitudes towards sexuality. GE credit: Div.—I, III. (I, II, III.)

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: field work experience or at least one course (e.g., course 100A, 100B, 140 or 140L) related to fieldwork assignment; consent of instructor. Supervised internship, off campus and on campus, in community and institutional setting. May be repeated for credit for a total of 12 units or if involves progressively greater (supervised) participation in program delivery or assessment. (P/NP grading only.)—I, II, III. (I, II, III.)

98. Directed Group Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

100A. Infancy and Early Childhood (4)
Lecture—4 hours. Prerequisite: Psychology 1 or 15, Biological Sciences 1A or 10. Analysis of the biological, social, and cultural influences in the psychological growth and development of children, prenatal through age six.—I, II, IV. (I, II.) Chen, Harper, Kraft

100B. Middle Childhood and Adolescence (4)
Lecture—4 hours; three brief observations of school-age children. Prerequisite: course 100A or the equivalent; introductory biology. Analysis of the interplay of biological and social-cultural factors in the emotional, cognitive and social development from middle childhood through adolescence.—II, III. (II, III.) Gueyr, Harper, Nishina

100C. Adulthood and Aging (4)
Lecture—4 hours. Prerequisite: Psychology 1 or 15. Development during early, middle, and late adulthood; biological, cognitive, and psycho-social aspects of adult development. Emphasis on normative patterns of development which characterize "successful aging."—I, III. Miller, Ober

101. Cognitive Development (4)
Lecture—3 hours; term paper. Prerequisite: course 100A or 100B or Psychology 140. Pass 1 restricted to Human Development or Psychology majors. Theories, methods, evidence, and debates in the field of cognitive development, such as nature/nurture, constraints on learning, and the role of plasticity. Topics include attention, memory, concepts about the physical and social world, and language. (Same course as Psychology 141.) GE credit: Wrt.—I, II, III. (I, II, III.) Chen, Gibbs, Goodman, Graf Ester, Lagattuta, Rivera

102. Social and Personality Development (4)
Lecture—3 hours; term paper. Prerequisite: course 100A or 100B or Psychology 140. Pass 1 open to Human Development or Psychology majors. Social and personality development of children, infancy through adolescence. Topics include the development of personality, achievement motivation, self-understanding, sex-role identity, and antisocial behavior. Emphasis on the interface between biological and social factors. (Same course as Psychology 142.) GE credit: SocSci, Wrt.—I, II, III. (I, II, III.) Conger, Gibbs, Lagattuta, Rivera, Robins

103. Cross-Cultural Study of Children (4)
Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S. GE credit: Div.—I. (III.)

110. Contemporary American Family (4)
Lecture—4 hours. Prerequisite: introductory psychology. Factors currently influencing American families including changing economic conditions, changing sex roles, divorce, and parenthood; theories and research on family interaction.—II. (II, III.) K. Conger

117. Longevity (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Nature, origin, determinants, and limits of longevity with particular reference to humans; emphasis on implications of findings from non-human model systems including natural history, ecology and evolution of life span; description of basic demographic techniques including life table methods. (Same course as Entomology 117.) GE credit: SciEng, Wrt.—I. (II.) Carey

120. Research Methods in Human Development (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100A or 100B; Statistics 13 or Education 114 or Psychology 41 or Sociology 46A and 46B. Scientific view of Human Development; origins of scientific inquiry; research strategies; preparation for conducting research; descriptive statistics and statistical inference (hypothesis testing); Statistical analysis and understanding results. Major emphasis on experimentation, collecting data, and analyzing results.—I, III. (II, III.) Nishina

121. Psychological Assessment (4)
Lecture—4 hours. Prerequisite: courses 100A-100B; elementary statistics. Current issues and methodology related to the process of psychological assessment with children.—I. Nishina

130. Emotionally Disturbed Children (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A and 100B or consent of instructor. Discussion of psychosis, neurosis, behavior disorders, and learning difficulties in children.—II. (II, III.) Bryant, Mastergeorge

132. Individual Differences in Cognition (4)
Lecture—4 hours. Individual differences in cognition, including learning disabilities and giftedness. Education implications and neurodevelopmental substrates of individual differences in cognition.—II, III. (II, III.) Kraft

140. Communication and Interaction with Young Children (2)
Lecture—2 hours. Prerequisite: course 100A; concurrent enrollment in course 140L required; consent of instructor. Integration of research, theory and practice in child development, emphasizing the role of relationships in creating a growth-promoting environment for young children. Includes: peer relationships, emotional understanding and self regulation, attachment, communication and school readiness. To enroll, students must sign up for laboratory time at the Child and Family Studies Center located at 244 First Street, Davis, CA.—I, II, III. (I, II, III.) Chen

140L. Laboratory in Early Childhood (3-5)
Laboratory—6-15 hours; laboratory/discussion—3 hours. Prerequisite: course 140, must be taken concurrently for first 3 units of credit; students must contact the Center for Child and Family Studies to enroll. Application of theories of learning and development to interaction with infants, toddlers, and preschoolers at Early Childhood Laboratory. Applied skills in communication, guidance and curriculum. Limited enrollment. May be repeated two times for credit. (P/NP grading only.)—I, II, III. (I, II, III.) Chen

141. Field Study With Children and Adolescents (4-6)
Lecture—2 hours, fieldwork—6-12 hours. Prerequisite: course 100A or 100B; consent of instructor. Study of children's affective, cognitive and social development within the context of family/school environments, hospitals and foster group homes. May be repeated for credit for a total of 12 units.—I, III. (I, II, III.) Kraft

142. Field Study with Emotionally Distressed Children and Adolescents (4-6)
Discussion—1.5 hours; fieldwork—6-12 hours. Prerequisite: course 130 (may be taken concurrently); consent of instructor. Field study with children who are identified as emotionally distressed, including those with internalizing and externalizing behavioral problems. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.—II. (II.) Bryant

143. Field Studies of the Elderly (4-6)
Discussion—2 hours; field work—6-12 hours. Prerequisite: course 100C or 160 may be taken concurrently. Apply theory and research on adult development and aging, work with older adults in a variety of settings, and develop skills relevant to that application. Develop a small research project.—I. (I.) Ober

160. Social Aspects of Aging (4)
Lecture—4 hours. Prerequisite: course 100C or Psychology 115. How the social context affects adult development and aging. Emphasis on demography, social policy, culture, and adaptation. Oral histories as class projects. Offered in alternate years. GE credit: Div.—II.

161. Applied Cognition and Aging (4)
Lecture/discussion—4 hours. Prerequisite: introductory social sciences course, Human Development, Psychology 1, Education, or a related social science, or permission of instructor. Principles from cognition and aging and applies these to real-world concerns in areas including education, technology, job performance, and health. Considers physical and social changes in later life that impact functioning. Offered in alternate years. GE Credit: SocSci, Wrt.—III. (I.) Miller

162. Issues in Aging (3)
Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: course 100C or 160. Research and policy issues concerning the elderly and aging in contemporary society. Offered in alternate years.

163. Cognitive Neuropsychology in Adulthood and Aging (4)
Lecture/discussion—4 hours. Prerequisite: Psychology 1; course 100C recommended. Theories, methods, and findings concerning the relationship between cognitive processes and brain functioning. Readings, lectures, and in-class discussions cover research on normal younger and older adults, neuropsychological case studies, and selected patient groups (e.g., amnesia, schizophrenia, Alzheimer's disease).—I. Ober

190C. Introductory Research Conference (1)
Discussion—1 hour. Prerequisite: involvement in ongoing research. Instructors lead discussions with undergraduate students who involve themselves in a research project. Research papers are reviewed and aspects of project proposals developed out of class are presented and evaluated. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. Supervised internship off and on campus, in community, and institutional settings. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

200A. Early Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology or physiology; one upper division course in psychology or a related field; one upper division or graduate course in developmental psychology (may be taken concurrently). Theory and research on the biological, social, cognitive, and cultural aspects of development from conception to the age of five years.—I. Chen, Harper

200B. Middle Childhood and Adolescence (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology or physiology, and at least two upper division or graduate-level courses in psychology or related fields. Theory and research on biological, cognitive, social, and cultural influences on behavioral development from age five years until late adolescence.—II. Bryant, Nishina

200C. Development in Adulthood (4)
Lecture/discussion—4 hours. Prerequisite: courses 200A and 200B. Theory and research focusing on social, personality, cognitive, and biological development from early to late adulthood. Emphasis is on theory development and continuity and change.—III. Ober, Miller

203. Adolescent Behavioral and Emotional Development (4)
Lecture/discussion—4 hours. Prerequisite: course 200B. Analysis of recent theories, research methods, and major findings on adolescent behavioral and emotional development, including contextual and genetic influences on adolescence, pubertal transitions, and social/family contexts and processes. Emphasis on multi-level mechanisms underlying adolescent behavioral and emotional development. Offered in alternate years.

205. Path Analysis, Factor Analysis, and Structural Equation Modeling (4)
Lecture—4 hours. Prerequisite: Psychology 204B or equivalent graduate courses in statistics or permission of the instructor; familiarity with multiple regression and the basics of matrix algebra. Graduate standing in HDGG, Psychology, Sociology, Education, or a related social science, or permission of the instructor. Introduction of basic concepts, principles, and applications of structural equation modeling including path analysis, confirmatory factor analysis, multiple-group modeling, and latent growth curve modeling. Offered in alternate years.

206. Cross-Sectional Data Analysis with Categorical Observed and Latent Variables (4)
Lecture—4 hours. Prerequisite: Psychology 204B or equivalent graduate courses in statistics or permission of the instructor; familiarity with multiple linear regression; restricted to Graduate standing in HDGG, Psychology, Sociology, Education, or a related social science, or permission of the instructor. Introduction to basic concepts, principles, and applications of: contingency table analysis; binary, multinomial, and ordinal logistic regression; latent class analysis; and latent trait analysis. Offered in alternate years.

207. Topics in Applied Cognitive Aging (4)
Lecture/discussion—2 hours. Prerequisite: graduate standing in Human Development Graduate Group, Psychology, Education, or a related social science, or consent of the instructor. Apply principles from cognitive aging to real-world concerns in areas such as education, technology, job performance, and health. Examine how physical and social changes occurring in later life impact functioning. Offered in alternate years.—I. Miller

210. Theories of Behavioral Development (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing in behavioral sciences. Consideration of enduring issues in theories of behavioral development; analysis of adequacy of major theoretical schools (e.g., social learning, Piagetian) as scientific theories. Offered in alternate years.—Harper

211. Physiological Correlates of Behavioral Development (4)
Seminar—4 hours. Prerequisite: consent of instructor. An overview of mechanisms of organismic development and the implications of developmental biology for the analysis of behavioral ontogeny; consideration of parallels between processes of organismic development and behavioral development in children and infra-human mammals. Offered in alternate years.—III. Harper

217. Development of Cortical and Perceptual Laterality (3)
Seminar—3 hours. Prerequisite: graduate standing in child or human development or consent of instructor. Current theory and research regarding the development of human cortical and perceptual laterality—emphasizing the relationship of this development to thinking and behavior. Offered in alternate years.—Kraft

220. Research Methods in Human Growth and Development (4)
Lecture—4 hours. Prerequisite: Statistics 13 or the equivalent and at least two upper division courses in Human Biology or Developmental Psychology. Overview of qualitative and quantitative approaches to empirical inquiry in the social sciences, with a focus on theory and research methods in biological growth and cognitive and social/emotional development from prenatal period to death.—III. (II.)

231. Issues in Cognitive and Linguistic Development (3)
Seminar—3 hours. Prerequisite: consent of instructor. Study and evaluation of key issues in the theoretical and empirical literature on cognitive and linguistic development.—(III.) Kraft

232. Cognition and Aging (3)
Lecture/discussion—3 hours. Prerequisite: course 200C. The manner in which cognitive processes are affected by aging as well as an understanding of the changes in the central nervous system occurring with aging. Offered in alternate years.—Ober

234. Children's Learning and Thinking (3)
Seminar—3 hours. Prerequisite: course 200A or Psychology 212 recommended. Analysis of theories, research methods, and major findings of children's higher-order cognition, including origins of knowledge, development of problemsolving skills, reasoning strategies, and scientific concepts, with an emphasis on the underlying mechanism involved in children's thinking and learning processes. Offered in alternate years.—Chen

238. The Context of Individual Development (3)
Lecture/discussion—3 hours. Prerequisite: graduate standing in Human Development, Child Development, Education, Psychology, Anthropology, Sociology, or consent of instructor. Analysis of human development within the context of daily life. Contextualizing theories and methods of developmental psychology will be distinguished from contextual theories and methods. Developmental psychology models will be distinguished from child psychology models. Offered in alternate years.—Bryant

239. Developmental Trajectories in Typical and Atypical Children; Birth to Five (4)
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing in Human Development, Psychology, Sociology, a related social science, or permission of the instructor. Discuss theories of development in typical and atypical children from birth to five from a socio-cultural perspective including parent-child interaction, peer interactions, cultural contexts of learning, as well as theoretical and empirical issues for understanding continuities and discontinuities in development. Offered in alternate years.—III. Mastergeorge

240. Peer Relationships During Adolescence (4)
Lecture/discussion—4 hours. Prerequisite: graduate standing in Human Development, Psychology, Education, or consent of instructor. Course examines the role of peer relationships in adolescent development including forms and functions at the individual, dyadic and group levels. Ethnicity and cross cultural research will be discussed. Emphasis on methodology, including surveys, peer nominations/sociometrics, experimental, and observational designs.—Nishina

250. Current Research on Family Relationships (4)
Lecture/discussion—6 hours; term paper. Prerequisite: graduate standing in Human Development Graduate Group, Psychology, Sociology, a related social science, or permission of the instructor. Discussion of theories, methods, and current research on the nature and development of sibling, romantic, and parent-child relationships across the lifespan. Emphasis on interpersonal and family processes examined in ethnic/cultural contexts. Implications for individual development will be addressed.—III. Conger

252. Family Research, Programs and Policy (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing in Human Development, Psychology, Sociology, related social sciences, or consent of instructor. Course examines the competing interests of research, policy, and service on current issues of family functioning and individual well being. The course considers communication barriers between researchers, practitioners, and policy makers. Offered in alternate years.—(III.) Conger

290. Seminar (3)
Seminar—3 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter.—I, II, III. (I, II, III.)

290C. Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Supervising instructors lead research discussions with their graduate students. Research papers are reviewed and project proposals are presented and evaluated. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

291. Research Issues in Human Development (4)
Seminar—4 hours. Prerequisite: graduate standing in the Behavioral Sciences. In-depth presentations of research issues in particular areas of behavioral development.—I, II. (I. II.) R. Conger, Kraft

292. Graduate Internship (1-12)
Internship—3-36 hours. Prerequisite: consent of faculty (internship sponsor) and satisfactory completion of placement-relevant course work, for example: Education 213, 216; course 222, 242; Law 272, 273. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated for credit up to 12 units if justified skill acquisition and promise of informing evaluation research. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Human Development (A Graduate Group)

Lawrence V. Harper, Ph.D., Group Chairperson

Group Office. 1337 Hart Hall
(530) 754-4109;
http://humandevelopment.ucdavis.edu

Faculty

Thomas F. Anders, M.D., Professor Emeritus *(Psychiatry)*
Brenda K. Bryant, Ph.D., Professor *(Human and Community Development)*
Zhe Chen, Ph.D., Professor *(Human and Community Development)*
Katherine J. Conger, Ph.D., Associate Professor *(Human and Community Development)*
Rand Conger, Ph.D., Professor *(Human and Community Development)*
Kathryn G. Dewey, Ph.D., Professor *(Nutrition)*
Emilio Ferrer, Ph.D., Associate Professor *(Psychology)*
Lorena Garcia, M.P.H., Dr.P.H., Assistant Professor *(Department of Public Health Sciences)*
Beth Goodlin-Jones, Ph.D., Associate Professor *(Psychiatry, M.I.N.D. Institute)*
Gail Goodman, Ph.D., Professor *(Psychology)*
Kevin Grimm, Ph.D., Assistant Professor *(Psychology)*
Amanda Guyer, Ph.D., Assistant Professor *(Human and Community Development, Center for Mind and Brain)*
Rangy Hagerman, M.D., Professor, Director (M.I.N.D. Institute)
Robin L. Hansen, M.D., Professor *(Pediatrics)*
Lawrence V. Harper, Ph.D., Professor *(Human and Community Development)*
Paul Hastings, Ph.D., Professor *(Psychology)*
David Hessl, Ph.D, Associate Professor *(Psychiatry, M.I.N.D. Institute)*
Suad Joseph, Ph.D., Professor *(Anthropology)*
Penelope Knapp, M.D., Professor *(Psychiatry, M.I.N.D. Institute)*
Rosemarie H. Kraft, Ph.D., Lecturer SOE *(Human and Community Development)*
Seymour Levine, Ph.D., Adjunct Professor *(Psychiatry)*
Ann Mastergeorge, Ph.D., Assistant Adjunct Professor *(Human and Community Development, M.I.N.D. Institute)*
Elizabeth Miller, M.D., Ph.D., Assistant Professor *(Pediatrics)*
Lisa Miller, Ph.D., Associate Professor *(Human and Community Development)*
Peter Mundy, Ph.D., Professor *(Education, M I.N.D. Institute)*
Adrienne Nishina, Ph.D., Assistant Professor *(Human and Community Development)*
Lisa Oakes, Ph.D., Professor *(Psychology, Center for Mind and Brain)*
Beth A. Ober, Ph.D., Professor *(Human and Community Development)*
Lenna Ontai, Ph.D. Associate Specialist in Cooperative Extension *(Human and Community Development)*
Richard Ponzio, Ph.D., Specialist in Cooperative Extension, Emeritus *(Human and Community Development)*
Susan Rivera, Ph.D., Associate Professor *(Psychology)*
Richard W. Robins, Ph.D., Professor *(Psychology)*
Sally Rogers, Ph.D., Professor *(Psychiatry, M I.N.D. Institute)*
Julie Schweitzer, Ph.D., Associate Professor *(Psychiatry, M I.N.D. Institute)*
Phillip Shaver, Ph.D., Professor *(Psychology)*
Ross A. Thompson, Ph.D., Professor *(Psychology)*
Susan Timmer, Ph.D., Clinical Specialist *(Pediatrics)*
Brian Trainor, Ph.D., Assistant Professor *(Psychology)*
Anthony Urquiza, Ph.D., Associate Professor *(Pediatrics)*
Karen Watson-Gegeo, Ph.D., Professor *(Education) Distinguished Graduate Mentoring Award*
Keith Widaman, Ph.D., Professor *(Psychology)*

Affiliated Faculty

Kristin Alexander, Ph.D., Associate Professor *(Child Development, Sacramento State University)*
Barbara Lehman, Ph.D., Assisitant Professor *(Psychology, Western Washington University)*
Katherine Masyn, Ph.D., Assistant Professor of Education *(Harvard University, Graduate School of Education)*

Graduate Study. The interdisciplinary and interdepartmental Graduate Group in Human Development offers a program of study leading to the Ph.D. degree. The program provides lifespan study of human behavioral development, with a balance of emphasis on biological, cognitive, and socio-emotional development in context. Recipients of the degree will be prepared to teach, to conduct research, and to be actively involved in public service in human behavioral development.

Applicants seeking consideration for admissions and fellowships must submit all materials by January 1.

Graduate Adviser. Contact the Group office.

Humanities

(College of Letters and Science)

Noah Guynn, Ph.D., Program Director

Program Office. 211 Sproul
(530) 752-0830; *http://humanities.ucdavis.edu*

Committee in Charge

Emily Albu, Ph.D. *(Classics)*
Larry Bogad, Ph.D. *(Theatre and Dance)*
Noah Guynn, Ph.D. *(French)*
Elisabeth Krimmer, Ph.D. *(German)*
Susette Min, Ph.D. *(Asian American Studies)*
Pablo Ortiz, D.M.A. *(Music)*

The Program of Study

The Humanities program is an undergraduate and graduate curriculum emphasizing innovative approaches to ideas that matter. Courses offered through the program are interdisciplinary in scope and aim to develop critical thinking and writing skills in three principal areas: major figures, works, and genres in world cultures; major themes in world literatures; and relationships between history, society, and culture.

Courses in Humanities (HUM)

Lower Division Courses

1. Humanities Forum (2)
Lecture—2 hours. Reading and discussion of a single work representative of a particular culture, historical period, or genre and significant for its ongoing cultural impact in the humanities, sciences, social sciences, technology, and popular arenas. Attention to provocative implications for contemporary society. May be repeated one time for credit if topic differs. GE credit with concurrent enrollment in HUM 1D.

1D. Issues and Concepts in the Humanities (2)
Discussion—2 hours. Prerequisite: course 1 concurrently. Small group discussions and preparation of short papers for course 1. May be repeated one time for credit if topic differs. GE credit with concurrent enrollment in course 1: ArtHum, Wrt.

2A. Global Humanities Forum (4)
Lecture—3 hours; extensive writing. Introduction to humanities topics and methodologies; analysis of major figures, works, and genres in world arts and literatures, with emphasis on relationships between history, society, and culture. May be repeated one time for credit if topic differs. GE Credit: ArtHum.—I, II, III. (I, II, III.)

2B. American Humanities Forum (4)
Lecture—3 hours; extensive writing. Introduction to humanities topics and methodologies; analysis of major figures, works, and genres in American arts and literatures, with emphasis on relationships between history, society, and culture. May be repeated one time for credit if topic differs. GE Credit: ArtHum.—I, II, III. (I, II, III.)

3. Medicine and Humanities (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: completion of Subject A requirement. Evolution of the "medical arts" into the "science of medicine." The culture of medicine in the context of society, medical ethics. GE credit: SocSci, Wrt.

4. Animals and Human Culture (2)
Lecture—2 hours. The meaning of human relations with animals studied across a variety of historical periods and culture and from a variety of humanistic perspectives. Offered in alternate years.

4D. Animals and Human Culture Discussion (2)
Discussion—2 hours. Prerequisite: concurrent enrollment in course 4. Small group discussions and preparation of short papers for course 4. Offered in alternate years. GE credit with concurrent enrollment in course 4: ArtHum, Wrt.—I.

7. Travel and Travel Literature (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: Subject A requirement. History of travel from the age of exploration to the modern era. Contemporary trends in travel, including mass tourism, adventure travel, and ecotravel. Social, economic, and cultural issues related to modern trends in travel. Analysis of literary representations of travel. GE credit: ArtHum, Div, Wrt.

8. Introduction to Perspectives on Narrative (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: satisfaction of Subject A requirement. Interdisciplinary approach to the use of story across time, culture, and discipline. How the telling and retelling of particular stories reflect the values, concerns, and assumptions of their original audiences and genres. GE credit: ArtHum or SocSci, Div, Wrt.

9. Don Quixote and the Modern World (2)
Lecture—2 hours. Reading Don Quixote as emblem of modernity in the West. Issues of reality versus illusion, heroism, freedom and self-fulfillment, racial tolerance and love. Don Quixote in other cultural and popular media: film, dance, art, musical drama, and television. Offered in alternate years. GE credit with concurrent enrollment in course 9D: ArtHum, Wrt.

9D. Don Quixote and the Modern World Discussion (2)
Discussion—2 hours. Prerequisite: course 9 concurrently. Small group discussions and preparation of short papers for course 9. Offered in alternate years.

13. Witches: Myth and Historical Reality (4)
Lecture—3 hours; extensive writing. This course examines the historical construction of the witch. The four areas covered are: European pagan religions and the spread of christianity; the "Burning' Times" in early modern Europe; 17th-century New England and the Salem witch trials; and fairytales. GE Credit: ArtHum, Div, Wrt.

15. Language and Identity (4)
Lecture/discussion—3 hours; extensive writing. Introduction to topics related to the construction of identity through language use, including geographical and social factors affecting language groups. Language ideology affecting linguistic groups, including bilinguals and non-native speakers of English. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

18. Performance and the 21st Century (4)
Lecture/discussion—3 hours; extensive writing. Live performance and globalization in the twenty-first century. Consideration of the cultural context of performing arts and artists including their methods of creativity. GE credit: ArtHum or SocSci, Div, Wrt.

60. Narrative and Argumentative Approaches to Major Current Issues in the Media, Culture, and Society (4)
Lecture/discussion—3 hours; term paper. Prerequisite: English A or the equivalent. Interdisciplinary approach to contemporary issues (abortion, AIDS, civil rights, war and peace, welfare state) around which individuals, communities and institutions define themselves in American society, by applying principles of narrative theory to the narratives where those issues are embedded. GE credit: ArtHum or SocSci, Div, Wrt.

92. Internship (1-12)
Internship—3-36 hours. Internships in fields where students can practice their skills. May be repeated for credit. (P/NP grading only.)

Upper Division Courses

144. Marx, Nietzsche, Freud (4)
Lecture/discussion—3 hours; term paper. Study of major texts of these thinkers, selected with an eye to their impact on 20th-century economics, ethics, and attitudes toward eros. Particular focus on conceptions of the self and the individual's relation to society. Offered in alternate years. GE credit: ArtHum, Wrt.

180. Topics in the Humanities (4)
Lecture/discussion—3 hours; term paper. Analysis of interdisciplinary issues in the Humanities. Topics will vary. May be repeated one time for credit. GE credit: ArtHum, Wrt.

192. Internship (1-12)
Internship—3-36 hours. Internships in fields where students can practice their skills. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-4)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-4)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

250. Topics in the Humanities (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the humanities, selected by the instructor. May be repeated one time for credit.

292. Graduate Internship (1-15)
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: consent of instructor required. Individually designed supervised internship, off campus, in community or institutional setting. Developed with advice of faculty mentor. May be repeated for credit up to 15 units. (S/U grading only.)

298. Directed Group Study (1-5)
(S/U grading only.)

299. Individual Research (1-4)
Individual research in the humanities resulting in a formal written research report. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. (S/U grading only.)

Hydrologic Sciences (A Graduate Group)

Graham Fogg, Ph.D., Chairperson of the Group

Group Office. 1 1152 Plant and Environmental Sciences Building; (530) 752-1669; *http://lawr.ucdavis.edu/graduate_hyd.htm* or *http://lawr.ucdavis.edu/hsgg/index.htm*

Faculty

Roger Bales, Ph.D., Professor *(UC Merced School of Engineering)*
Fabian Bombardelli, Ph.D., Assistant Professor *(Civil and Environmental Engineering)*
William Casey, Ph.D., Professor *(Chemistry)*
Randy Dahlgren, Ph.D., Professor *Academic Senate Distinguished Teaching Award*
Graham Fogg, Ph.D., Professor
Timothy Ginn, Ph.D., Professor *(Civil and Environmental Engineering)*
Mark Grismer, Ph.D., Professor
Charles Goldman, Ph.D., Professor *(Environmental Science and Policy)*
Thomas Harmon, Ph.D., Professor *(UC Merced Environmental Systems School of Engineering)*
Peter Hernes, Ph.D., Associate Professor
Jan Hopmans, Ph.D., Professor
William Horwath, Ph.D., Professor
Michael Johnson, Ph.D., Associate Director center for Watershed Sciences
M. Levent Kavvas, Ph.D., Professor *(Civil and Environmental Engineering)*
Bruce Kutter, Ph.D., Professor *(Civil and Environmental Engineering)*
John Largier, Ph.D., Professor *(Bodega Marine Laboratory)*
Mark Lubell, Ph.D., Professor *(Environmental Science and Policy)*
Jay Lund, Ph.D., Professor *(Civil and Environmental Engineering)*
Douglas Mackay, Ph.D., Adjunct Professor
James McClain, Ph.D., Professor *(Geology)*
Jeffrey Mount, Ph.D., Professor *(Geology)*
Alexandra Navrotsky, Ph.D., Professor
Gregory Pasternack, Ph.D., Professor
Kyaw Tha Paw U, Ph.D., Professor
Carlos Puente, Ph.D., Professor
Eliska Rejmankova, Ph.D., Professor *(Environmental Science and Policy)*
Paul Sabatier, Ph.D., Professor *(Environmental Science and Policy)*
S. Geoffrey Schladow, Ph.D., Professor *(Civil and Environmental Engineering)*
Kate Scow, Ph.D., Professor
Wendy K. Silk, Ph.D., Professor
Johan Six, Ph.D., Professor *(Plant Sciences)*
Howard Spero, Ph.D., Professor *(Geology)*
Susan Ustin, Ph.D., Professor
Wesley Wallender, Ph.D., Professor
Bryan Weare, Ph.D., Professor
Tom Young, Professor *(Civil and Environmental Engineering)*
Minghua Zhang, Ph.D., Adjunct Professor
Robert Zierenberg, Ph.D., Professor *(Geology)*

Emeriti Faculty

Harrison Dunning, LL.B., Professor Emeritus *(School of Law)*
Theodore Hsiao, Ph.D., Professor Emeritus
Miguel Marino, Ph.D., Distinguished Professor Emeritus
Dennis Rolston, Ph.D., Professor Emeritus

Affiliated Faculty

Philip Duffy, Ph.D., Adjunct Associate Professor *(School of Natural Resources, U.C. Merced)*
Joan Florsheim, Ph.D., Associate Research Geologist *(Geology)*
David Goldhamer, Ph.D., Irrigation Specialist Emeritus
Stephen Grattan, Ph.D., Water Relations Specialist
Blaine Hanson, Ph.D., Irrigation Specialist

Thomas Harter, Ph.D., Cooperative Extension Specialist
Terry Prichard, M.S., Water Management Specialist
Lawrence Schwankl, Ph.D., Irrigation Specialist
Richard Snyder, Ph.D., Biometeorologist Specialist
Kenneth Tate, Specialist in Cooperative Extension *(Plant Sciences)*

Graduate Study. The Graduate Group in Hydrologic Sciences is an interdisciplinary program offering M.S. and Ph.D. degrees. Course work is available from many programs, including Hydrologic Sciences, Civil and Environmental Engineering, Geology, and Soil Science. Education in the group broadens the skills and knowledge of the physical science or engineering student interested in the occurrence, distribution, circulation and properties of water on earth. Because of water's ubiquity and importance to physical, chemical and biological processes, hydrologic sciences involve the geologic, atmospheric and oceanic sciences, as well as engineering and other applied physical sciences. Basic to the program are core courses in fluid dynamics, hydrologic phenomena, hydrobiology, hydrogeochemistry, hydrologic techniques, and hydrologic policy. Students can pursue specializations in hydrogeochemistry, surface hydrology, subsurface hydrology, irrigation and drainage, watershed hydrology and water resources management. The subsurface hydrology specialization includes hydrogeology and vadose-zone hydrology.

Preparation. Applicants to the program are expected to have completed or to be completing an undergraduate degree in environmental or physical sciences, mathematics, or engineering. Undergraduate study must include one year each of calculus, of physics with calculus, and of chemistry. A second year of vector calculus, linear algebra and differential equations is recommended and will be required, before completion of graduate work. Additional courses in applied statistics, computer programming, and geology are recommended.

Specialization. Each student will pursue an individual program of advanced study under the direction of a group of faculty members with similar interests but diverse backgrounds. Course work in addition to the above is typically taken in the most appropriate departments.

Graduate Adviser. Mark E. Grismer *(Land, Air and Water Resources)*

Graduate Admissions Adviser. Carlos Puente, Ph.D.

Courses in Hydrologic Sciences (HYD)

Graduate Courses

200. Survey of Hydrologic Sciences (1)
Seminar—1 hour; term paper. Prerequisite: open to students in the Hydrologic Sciences program. Seminar course exposes students to the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of research interest. May be repeated two times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Grismer

205. Continuum Mechanics of Natural Systems (4)
Lecture/discussion—4 hours. Prerequisite: Mathematics 21D and 22B, Physics 9B. Continuum mechanics of static and dynamic air, water, earth and biological systems using hydraulic, heat and electrical conductivity; diffusivity; dispersion; strain; stress; deformation gradient; velocity gradient; stretch and spin tensors. (Same course as Biological Systems Engineering 205.)—I. Wallender

210. Vadose Zone Transport Processes and Modeling (3)
Lecture/discussion—3 hours. Prerequisite: Soil Science 107, Mathematics 22B, programming language, or consent of instructor. Principles and modeling of water flow and chemical transport in the vadose zone, with specific applications to soils. Topics include hydraulic properties, finite difference application to unsaturated water flow, parameter optimization, diffusive and convective transport in gaseous and liquid phases. Offered in alternate years.—III. Hopmans

243. Water Resource Planning and Management (3)
Lecture—3 hours. Prerequisite: course 141 or Civil and Environmental Engineering 142. Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, design and management. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models. (Same course as Biological Systems Engineering 243.)—I. (I.) Marino

252. Hillslope Geomorphology and Sediment Budgets (4)
Lecture—3 hours; fieldwork—3 hours. Prerequisite: course 141 or Geology 35 or Civil and Environmental Engineering 142 or consent of instructor. Exploration of theoretical and empirical foundations of sediment production on hillslopes using computer models and field experiments to promote an understanding of how watersheds evolve naturally and with human impacts. Offered in alternate years.—III. Pasternack

256. Geomorphology of Estuaries and Deltas (4)
Lecture—3 hours; fieldwork—3 hours. Prerequisite: course 141 or Geology 35 or Civil and Environmental Engineering 42 or consent of instructor. Survey of the processes and landforms associated with sediment deposition in the coastal zone. Application of geomorphic principles to coastal management issues. Offered in alternate years.—III. Pasternack

264. Modeling of Hydrologic Processes (3)
Lecture—3 hours. Prerequisite: course 141 or the equivalent and Statistics 102 or the equivalent. Techniques used to model the spatio-temporal structure of rainfall and runoff are introduced. Procedures studied include those based on stochastic point processes, chaos theory, fractal geometry, and fractional noises. Offered in alternate years.—(III.) Puente

269. Numerical Modeling of Groundwater Systems (3)
Lecture—3 hours. Prerequisite: course 145A or Civil Engineering 144 and course 145B, Mathematics 22B. Finite difference and finite element techniques in modeling groundwater flow and transport. Fundamentals of constructing and calibrating models with hands-on applications. Methods and limitations of numerical solution of transport equations. Model interpretation and ethics.—(III.) Fogg

273. Introduction to Geostatistics (3)
Lecture—3 hours. Prerequisite: Statistics 130A and 130B, or the equivalent. Statistical treatment of spatial data with emphasis on hydrologic problems. Topics include theory of random functions, variogram analysis, Kriging, co-Kriging, indicator geostatistics, and stochastic simulation of spatial variability. Demonstration and use of interactive geostatistical software included. Offered in alternate years.—I. Fogg

275. Analysis of Spatial Processes (3)
Lecture—3 hours. Prerequisite: Statistics 102 or the equivalent; course 273 or Statistics 273A recommended. Characterization of homogeneous random fields; extremes and spectral parameters; geometry of excursions, local averaging; scale of fluctuation; non-Gaussian and irregular random fields; geostatistical applications. Offered in alternate years.—(III.) Puente

286. Selected Topics in Environmental Remote Sensing (3)
Discussion—2 hours; lecture—1 hour; project. Prerequisite: consent on instructor; Environmental and Resource Sciences 186 or equivalent required; Environmental and Resource Sciences 186L recommended. In depth investigation of advanced topics in remote sensing applications, measurements, and theory. May be repeated for credit. Not offered every year.—Ustin

290. Seminar in Hydrologic Science (1)
Seminar—1 hour. Prerequisite: graduate standing and background in Hydrologic Science, consent of instructor. Seminars and critical review of problems, issues, and research in hydrologic sciences. Oral presentations of research. Topics will vary. May be repeated for credit. (S/U grading only.)—III. (III.)

298. Group Study (1-5)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299. Research (1-12)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Professional Courses

410. OSHA HAZWOPER Refresher Course (1)
Lecture—1 hour. Updates hazardous materials handling information for purposes of keeping certification current. Certification lapses until the refresher course is complete. (P/NP grading only.)—II. (II.) Grismer

440. Hazardous Waste Operations Training (3)
Lecture—2 hours; laboratory—2 hours. Prerequisite: upper division standing in College of Agricultural and Environmental Sciences. Forty-hour course designed to meet the requirements of Federal OSHA regulation CFR 1910.120. Covers the health, regulatory, processing and safe handling issues/problems associated with working with hazardous materials. (P/NP grading only.)—III. (III.) Grismer

Hydrology

(College of Agricultural and Environmental Sciences)

Faculty. See under Department of Land, Air and Water Resources, on page 354, Hydrology Section.

The Major Program

Hydrology is the study of the occurrence, distribution, circulation, and behavior of water and waterborne materials in the environment of Earth. It includes practical measurement and technical analysis of water phenomena underground, on the Earth's surface, and in the atmosphere. Contemporary hydrologic problems costing society $10-100 billion per year include environmental restoration, sustainability of groundwater and surface water resources, water pollution, and natural disasters such as floods, droughts, landslides, avalanches, and land subsidence. The management of these problems demands hydrologic scientists with the comprehensive, interdisciplinary education embodied in this program. Beyond its societal utility, hydrology can be an exciting science for the curious-minded. Hydrologists explore natural phenomena such as climate change, waterfalls, health of coral reefs, biogeochemical cycles, and aquifers.

The Program. A hydrologist needs a strong background across the basic sciences of physics, mathematics, chemistry, and biology. Breadth of understanding comes from exposure to ecology, geology, engineering, policy, and law. Depth of experience is provided by core hydrology courses, internship opportunities, and practical outdoor training. Students choose electives to match their interests and career goals. Transfer students should have completed as much as possible of the preparatory subject matter listed below.

Internships and Career Alternatives. Job opportunities in hydrology exceed the available supply of trained hydrologists. Students commonly obtain internships and jobs with state and federal agencies, private consulting firms, environmental

interest groups, irrigation districts, and utility companies. Federal agencies hiring hydrologists include the U.S. Geological Survey, U.S. Department of Agriculture (Fish and Wildlife, Agricultural Research, Forest Service, and National Resource Conservation Service), Environmental Protection Agency, and national research laboratories (Lawrence Livermore National Laboratory, Oak Ridge National Laboratory). State and local agency employers include California's Departments of Water Resources, Conservation, Fish and Game, and Toxic Substances as well as the Water Resources Control Board and Regional Water Quality Control Boards. To obtain higher levels of responsibility and salary, hydrologists often seek advanced degrees, and the hydrology major is designed to provide students with a highly competitive education to get into graduate school.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 67

- Biological Sciences 1A, 1C, or 2A, 2B..... 9-10
- Chemistry 2A, 2B, 2C 15
- Physics 9A, 9B, 9C 15
- Mathematics 21A, 21B, 21C, 21D, 22A, 22B..... 22
- Geology 50, 50L 5
- Engineering 6 or the equivalent..... 4

Depth Subject Matter..... 46-55

- Hydrologic Science 103N or Engineering 103 or equivalent..... 4
- Civil and Environmental Engineering 114 or Statistics 130A and 130B 4-6
- Hydrologic Science 134, 141, 142, 144, 151 21
- Soil Science 107..... 5
- Select one of Hydrologic Science 150, Agricultural and Resource Economics 147, Environmental Science and Policy 161, 166..... 3-4
- Select three of Hydrologic Science 110, 122 124, 143, 146; Civil and Environmental Engineering 141; Applied Biological Systems Technology 165 9-13

Restricted Electives 16-26

- To supplement or expand areas of student interest selected with approval of adviser

Total Units for the Major..... 129-148

Major Adviser. Greg Pasternak *(Land, Air and Water Resources)*

Minor Program Requirements:

Hydrology

The Hydrology Section of the Department of Land, Air and Water Resources offers the minor in Hydrology for environmental or natural science students who have an interest in water/environmental issues. The interested student should have completed preparatory course work in calculus (Mathematics 16B), chemistry (Chemistry 2A; Chemistry 2B recommended), physics (Physics 5A), and biology (Biological Sciences 1A). Course work in the minor provides fundamental skills and knowledge of the hydrologic sciences. The program is sufficiently flexible for students to pursue particular water issues or problems of interest to them.

UNITS

Hydrology..... 20-23

- Hydrologic Science 103N or Engineering 103..... 4
- Hydrologic Science 141 or Environmental and Resource Sciences 100..... 4
- Hydrologic Science 144 4
- Soil Science 107..... 5
- Hydrologic Science 134, Chemistry 100, Soil Science 111, or Environmental Science and Policy 151 3-6

Watershed Science

The Hydrology Program of the Department of Land, Air and Water Resources offers the minor in Watershed Science. This minor is intended for environmental, natural, or social science students who have an interest in the interfaces between hydrology, ecology, policy and management. The interested student should have completed preparatory course work in calculus (Mathematics 16B), chemistry (Chemistry 2A; Chemistry 2B recommended), physics (Physics 7A), and biology (Biological Sciences 1A). Course work in the minor provides fundamental skills and knowledge on science and management of watersheds in the context of current water resources and ecological problems.

Minor Program Requirements:

UNITS

Watershed Science 21-26

- Hydrologic Science 141 or Environmental and Resource Sciences 100..... 4
- Soil Science 100 or 118..... 4-5
- Hydrologic Science 144 or Soil Science 107..... 4-5
- Environmental and Resource Science 136, Hydrologic Science 124, or Hydrologic Science 151 4
- Hydrologic Science 143, Environmental and Resource Sciences 144, or Environmental Science and Policy 151..... 3-4
- Hydrologic Science 150, Environmental and Resource Sciences 121, or Environmental Science and Policy 161 3-4

Minor Advisor. Graham Fogg (530) 752-6810; *gefogg@ucdavis.edu*.

Advising Center. 1150 PES Building

Courses in Hydrologic Science (HYD)

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center in 113 Veihmeyer Hall or in 1150 Plant and Environmental Sciences Building (530) 752-1603.

Lower Division Courses

10. Water, Power, Society (3)
Lecture—2 hours; discussion—1 hour. Water resources issues. How water has been used to gain and wield socio-political power. Water resources development in California as related to current and future sustainability of water quantity and quality. Roles of science and policy in solving water problems. (Same course as Science and Society 10.) GE credit: SciEng or SocSci, Wrt.—III. (III.) Fogg

47. Watershed Processes and Water Quality in the Tahoe Basin (2)
Lecture/laboratory—21 hours; fieldwork—9 hours; discussion—3 hours; term paper. Prerequisite: basic knowledge of environmental, soil, or hydrologic sciences. Course involves 3 days of instruction in Tahoe City. Watershed processes, runoff water quality management, and restoration in the Lake Tahoe Basin. Soils, precipitation-runoff, revegetation and adaptive management related to erosion control, effective solutions, and development of restoration strategies. Students develop and initiate field restoration. (Same course as Environmental and Resource Sciences 47.)—IV. (IV) Grismer

92. Hydrologic Science Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division student, consent of instructor. Work experience off and on campus in Hydrologic Science. Internship supervised by a member of the faculty. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

103N. Fluid Mechanics Fundamentals (4)
Lecture—4 hours. Prerequisite: Physics 9B. Fluid mechanics axioms, fluid statics, kinematics, velocity fields for one-dimensional incompressible flow and boundary layers, turbulent flow time averaging, potential flow, dimensional analysis, and macroscopic balances to solve a range of practical problems. (Same course as Biological Systems Engineering 103.)—II. (II.) Wallender

110. Irrigation Principles and Practices (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 7A; Soil Science 100 recommended. General course for agricultural and engineering students dealing with soil and plant aspects of irrigation and drainage. Soil-water principles including water movement, plant responses to irrigation regimes, water use by crops; also irrigation systems and water quality. Offered in alternate years. Not open for credit to students who have completed Water Science 110.—(III.) Goldhamer, Grattan

124. Plant-Water-Soil Relationships (4)
Lecture—3 hours; discussion—1 hours. Prerequisite: one upper division course in soil science, such as Soil Science 100; and one upper division course in plant science or plant biology, such as Plant Biology 111; or consent of instructor. Principles of plant interactions with soil and atmospheric water environments and practical applications to crop management (e.g., irrigation) and plant eco-physiology (e.g., drought). Not open for credit to students who have completed Water Science 104.—III. (III.) Shackel

134. Aqueous Geochemistry (6)
Lecture—4 hours; laboratory—3 hours. Prerequisite: Chemistry 2B. Chemistry of natural waters; dielectric properties of water; thermodynamic and mass-action relations; metal hydrolysis; acid-base equilibria; metalcoordination chemistry; solubility calculations; electron-exchange reactions; sorptive partitioning; ion exchange; and dissolved organic matter.—III. (III.) Hernes, Parikh

141. Physical Hydrology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 9B, Mathematics 21B; course 100 recommended. Introduction to the processes that constitute the hydrologic cycle. Special emphasis on a quantitative description of the following processes: precipitation, infiltration, evaporation, transpiration, surface runoff, and groundwater runoff.—I. (I.) Puente

142. Systems Hydrology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 141 or Civil and Environmental Engineering 142. General course considering hydrologic processes from a systems or statistical model perspective. General probability concepts are applied to frequency, time series and spatial data analysis. Linear systems are also considered in conjunction with Kalman filter techniques.—II. (II.) Puente

143. Hydrological Processes in Ecosystems (3)
Lecture—3 hours. Prerequisite: course 141 or Environmental and Resource Science 100. Movement and storage of water are integral parts of landscape and ecosystem functioning. Hydrological processes in individual ecosystems and the role of water linking the myriad components of the landscape.—(II.) Pasternack

144. Groundwater Hydrology (4)
Lecture—4 hours. Prerequisite: Mathematics 16B or 21A; course 103 or Engineering 103 recommended. Fundamentals of groundwater flow and contaminant hydrology. Occurrence, distribution, and movement of groundwater. Well-flow systems. Aquifer tests. Well construction operation and maintenance. Groundwater exploration and quality assessment. Agricultural threats to groundwater quality: fertilizers, pesticides, and salts. Same course as Hydrologic Science 144.—I. (I.) Marino

146. Hydrogeology and Contaminant Transport (5)
Lecture—3 hours; laboratory—2 hours; term paper. Prerequisite: course 144 or Civil and Environmental Engineering 144 or the equivalent. Physical and chemical processes affecting groundwater flow and contaminant transport, with emphasis on realistic hydrogeologic examples. Groundwater geology and chemistry. Fundamentals of groundwater flow and transport analysis. Laboratory includes field pumping test and work with physical and computer models. (Same course as Geology 156.)—II. (II.) Fogg

147. Runoff, Erosion and Water Quality Management in the Tahoe Basin (3)
Lecture/laboratory—30 hours; fieldwork—15 hours; discussion—10 hours; term paper. Prerequisite: Physics 7B or 9B, Mathematics 16C or 21C, Civil and Environmental Engineering 142 or course 141 or Environmental and Resource Sciences 100. 5 days of instruction in Tahoe City. Practical hydrology and runoff water quality management from Tahoe Basin slopes. Development of hillslope and riparian restoration concepts, modeling and applications from physical science perspectives including precipitation-runoff relationships, sediment transport, and detention ponds. (Same course as Biological Systems Engineering 147.)—IV. (IV.) Grismer

150. Water Law (3)
Lecture—3 hours. Prerequisite: Environmental and Resource Sciences 100 or 121 or consent of instructor. Principles and issues of California Water Law. Types of water rights, groundwater rights and management, and protection of instream uses. Water projects, role of federal government and federal/state relations. Basic water quality acts, endangered species act, water transfers and current water issues.—II. Cahill

151. Field Methods in Hydrology (4)
Lecture—2 hours; laboratory—3 hours; fieldwork—3 hours. Prerequisite: Environmental and Resource Sciences 100 or course 141. Measurement methods and data analysis for evaluation of water storage, movement and contamination in the field. Equipment such as data loggers, water and sediment samplers, pressure transducers, weather stations, surveying equipment, and flow meters will be used.—II. Pasternack

182. Environmental Analysis using GIS (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: Applied Biological Systems Technology 180 or the equivalent GIS experience and skills; general biology and/or ecology courses recommended. Ecosystem and landscape modeling with emphasis on hydrology and solute transport. Spatial analysis of environmental risk analysis including ecological risk assessment, natural resource management. Spatial database structures, scripting, data models, and error analysis in GIS. (Same course as Applied Biological Systems Technology 182.) Offered in alternate years.—III. Zhang

192. Hydrologic Science Internship (1-12)
Internship—3-40 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in water science. Internship supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: senior standing. (P/NP grading only.)

Immunology (A Graduate Group)

Nicole Baumgarth, D.V.M., Ph.D., Chairperson of the Group

Group Office. 5217 Vet Med 3A; (530) 754-0103; *http://immunology.compmed.ucdavis.edu/*

Faculty

Alaa Afify, M.D., Associate Professor and Director *(Pathology)*
Paul Ashwood, Ph.D., Assistant Professor *(Medical Microbiology, and Immunology)*
Stephen Barthold, D.V.M., Ph.D., Professor and Director *(Center for Comparative Pathology and Pathology, Microbiology and Immunology)*
Nicole Baumgarth, D.V.M., Ph.D., Professor *(Center for Comparative Medicine and VME)*
Andreas Baumler, Ph.D., Professor *(Medical Microbiology, and Immunology)*
Charles Bevins, M.D., Ph.D., Professor *(Medical Microbiology, and Immunology)*
Christopher L. Bowlus, M.D., Associate Professor *(Gastroenterology)*
Camie Chan, Ph.D., Assistant Professor *(Cell Biology and Human Anatomy)*
Anthony T. Cheung, Ph.D., Professor Emeritus *(Pathology and Laboratory Medicine)*
Kiho Cho, Ph.D., Associate Adjunct Professor *(Surgery)*
Satya Dandekar, Ph.D., Professor and Chair *(Medical Microbiology, and Immunology)*
Kent L. Erickson, Ph.D., Professor *(Cell Biology and Human Anatomy)*
Laurel J. Gershwin, D.V.M., Ph.D., Professor *(VME: Pathology, Microbiology, and Immunology)*
M. Eric Gershwin, M.D., Professor and Chief *(Rheumatology, Allergy and Clinical Immunology)*
Tzipora Goldkorn, Ph.D., Professor *(Pulmonary and Critical Care Medicine)*
Leigh G. Griffiths, Vet.MB, MRCVS, Ph.D., Associate Professor *(VME: Veterinary Medicine and Epidemiology)*
Daniel Hwang, Ph.D., Adjunct Professor *(Nutrition)*
Kirk C. Klasing, Ph.D., Professor *(Animal Science)*
Hsing-Jien Kung, Ph.D., Professor and Deputy Director *(Cancer Center Basic Science)*
Kit S. Lam, M.D., Ph.D., Professor and Chief *(Hematology and Oncology)*
Bill Lasley, Ph.D., Professor Emeritus *(Population, Health and Reproduction)*
Pam Lein, Ph.D., Associate Professor *(VM Molecular Biosciences)*
Patrick S.C. Leung, Associate Adjunct Professor *(Rheumatology, Allergy and Clinical Immunology)*
Fu-Tong Liu, M.D., Ph.D., Professor and Chair *(Dermatology)*
Shirley Luckhart, Ph.D., Associate Professor *(Medical Microbiology, and Immunology)*
Melinda H. MacDonald, D.V.M., Ph.D., Associate Professor *(Surgical and Radiological Sciences)*
Emanual Maverakis, M.D., Assistant Professor *(Dermatology)*
Lisa A. Miller, Ph.D., Associate Professor *(Anatomy, Physiology and Cell Biology)*
William J. Murphy, Ph.D., Professor *(Dermatology)*
Lorena Navarro, Ph.D., Assistant Professor *(Microbiology)*
Robert T. O'Donnell, M.D., Ph.D., Associate Professor *(Hematology and Oncology)*
John Peters, Ph.D., Associate Professor-in-Residence *(Internal Medicine)*
Kent E. Pinkerton, Ph.D., Professor and Director *(Anatomy, Physiology and Cell Biology) Distinguished Teaching Award-Graduate/Professional*
Siba Raychaudhuri, M.D., Clinical Assistant Professor and Chief Rheumatologist *(Sacramento VA Medical Center)*
Subhadip Raychaudhuri, Ph.D., Assistant Professor *(Biomedical Engineering)*
Gary Rhodes, Ph.D., Professor Emeritus *(Pathology)*
Grace L. Rosenquist, Ph.D., Assistant Adjunct Professor *(Neurobiology, Physiology, and Behavior)*
Barbara Shacklett, Ph.D., Associate Professor *(Medical Microbiology, and Immunology)*
Scott I. Simon, Ph.D., Professor *(Biomedical Engineering)*
Jay Solnick, M. D., Ph.D., Professor *(Center for Comparative Medicine and Medical Microbiology and Immunology)*
Ellen E. Sparger, D.V.M., Ph.D., Associate Adjunct Professor *(Medicine and Epidemiology)*
Charles B. Stephensen, Ph.D., Associate Adjunct Professor *(Western Human Nutrition Research Center)*
Jeffrey L. Stott, Ph.D., Professor *(VME Pathology, Microbiology, and Immunology)*
Yoshikazu S. Takada, M.D., Ph.D., Professor *(Dermatology)*
Suzanne S. Teuber, M.D., Associate Professor *(Rheumatology, Allergy and Clinical Immunology)*
Jose V. Torres, Ph.D., Professor *(Medical Microbiology, and Immunology)*
Alfonso Tramontano, Ph.D., Adjunct Professor *(Nephrology)*
Renee M. Tsolis, Ph.D., Associate Professor *(Medical Microbiology, and Immunology)*
Joseph M. Tuscano, M.D., Associate Professor *(Hematology and Oncology)*
Judy Van de Water, Ph.D., Professor-in-Residence *(Rheumatology, Allergy and Clinical Immunology)*
Andrew Vaughan, Ph.D., Professor *(Radiation Oncology)*
Robert H. Weiss, M.D., Associate Professor *(Nephrology)*
Jean Wiedeman, M.D., Associate Professor *(Pediatrics)*
Reen Wu, Ph.D., Professor *(Anatomy, Physiology and Cell Biology)*
Heike Wulff, Ph.D., Assistant Professor *(Pharmacology)*
Tilahun D. Yilma, D.V.M., Ph.D., Director and Distinguished Professor of Virology *(Medical Microbiology and Immunology and Pathology, Microbiology, and Immunology)*

Graduate Study. The Graduate Group in Immunology is a multidisciplinary group offering a strongly interdisciplinary, flexible program in an exciting field of biology and medicine programs of study leading to the M.S. and Ph.D. degrees in various aspects of immunology. Participating faculty from various Schools and Departments at UC Davis provide research opportunities in the wide area of applied immunology. A focus of the program is infection and immunity, including host response regulation to parasites, viruses and bacteria and vaccine development and immune regulation. Other areas include nutrition and immunity, autoimmunity, cancer therapy and immune mediators and their uses for diagnosis and treatment.

Preparation. Applicants for candidacy to these programs should have completed undergraduate preparation in mathematics, physics, chemistry, biochemistry, molecular and cellular biology or related biological and medical sciences.

For work leading to the Ph.D. degree, the requirements include cell biology, chemical immunology, cellular immunology, immunohematology, and advanced immunology. In addition to these general requirements, more specialized preparation in at least one of the following is required: *(a)* microbiological specialties (bacteriology, virology, parasitology, medical microbiology); *(b)* zoological specialties (cell biology, endocrinology, embryology, proto-zoology, histology, cytology, physiology); *(c)* medical specialties (pathology, anatomy, pharmacology, clinical pathology, reproduction, hematology, epidemiology); *(d)* biochemistry/biophysics specialties (biologically active molecules, control mechanisms); *(e)* genetic specialties (developmental genetics, population genetics, cytogenetics, molecular genetics).

Graduate Adviser. See the graduate program website at *http://immunology.compmed.ucdavis.edu/people/*.

Courses in Immunology (IMM)

Additional courses are available and listed under the individual sponsoring departments. Contact the Group office for information.

Lower Division Course

94. Introduction to Undergraduate Research (1)
Seminar—1 hour. Prerequisite: course 9, consent of instructor and completion of 45 units with a minimum GPA of 3.500; limited to sophomores who participated in the Integrated Studies Honors Program during their freshman year and other students by consent of instructor. The nature of research at the undergraduate level. Limited enrollment. (P/NP grading only.)—II. (II.)

Graduate Courses

201. Introductory Immunology (4)
Lecture—4 hours. Prerequisite: graduate standing. Comprehensive introduction to the principles of immunology. Limited enrollment.—I. (I.) Miller

201L. Advanced Immunology Laboratory Rotations (5)
Lecture/discussion—15 hours. Two five-week assignments in immunology research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated two times for credit. (S/U grading only.)—I, II. (I, II.) Baumler

204. Topics in Innate Immuniy (2)
Extensive writing or discussion—1 hour; performance instruction—1 hour. Prerequisite: course 201 or equivalent; course 293 preferred. Restricted to first- or second-year GGI and MGG students; others with permission of instructor. Enrollment limited to 18 students. Covers current topics in the field of innate immunity through student seminar presentations and critical evaluation of the literature. Concepts include: pathogen recognition, intercellular communication, specialized cellular function and effector/signaling molecules. Offered in alternate years.—(IV.) Bevins

292. Immunotoxicology Seminar (2)
Seminar—2 hours. Prerequisite: graduate standing in Pharmacology/Toxicology, Immunology, Physiology, or Biochemistry. Seminar presentations dealing with principles of xenobiotic effects on immune system functions and specific examples of drugs and environmental chemicals exerting toxic effects on the immune system. Offered in alternate years. (S/U grading only.)—I. Golub

293. Current Concepts in Immunology (4)
Lecture/discussion—4 hours. Prerequisite: Pathology, Microbiology, and Immunology 126 or consent of instructor. Innate and acquired immunity as defense mechanisms against disease. Mechanisms regulating the distinct cell types driving these responses and current concepts in the literature.—II. Baumgarth

294. Comparative Clinical Immunology (4)
Lecture/discussion—4 hours. Prerequisite: Pathology, Microbiology, and Immunology 126 or consent of instructor. Clinical immunology in animals and man. Pathogenesis of representative infectious diseases, hypersensitive reactions, and autoimmunity. Emphasis on specific and nonspecific immune effector mechanisms to combat infections or mediate pathology. Not open for credit to students who have completed course 294A.—Gershwin, Van de Water

295. Cytokines (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 293 or consent of instructor. Cytokines and their involvement in human and animal physiology/disease, molecular mechanisms and receptor signaling. Immune and non-immune actions. Overlapping/redundant functions (referred to as the "cytokine network").—III. Erickson

296. Advanced Topics in Immunology (2)
Seminar—2 hours. Prerequisite: graduate standing or consent of instructor. Presentation, discussion, and analysis of faculty research topics in immunology. Required for Immunology Graduate Students every year until they have passed their qualifying exam. May be repeated for credit. (S/U grading only.)—I. (I.) Maverakis

297. Mucosal Immunology (2)
Lecture—1 hour; discussion—1 hour; term paper. Prerequisite: course 201 or equivalent. Basic concepts and current research topics in the field of mucosal immunology, with an emphasis on human immunology. Major emphases include innate and adaptive mucosal immunity, the gastrointestinal tract, the lung, lymphocyte trafficking, and mucosal vaccination. Offered in alternate years.—II. Shacklett

Independent Study Program

Information. Chairperson, Committee on Courses of Instruction, c/o Academic Senate Office
(530) 752-2231

The Independent Study Program provides an opportunity for upper division students to design and pursue a full quarter (12-15 units) of individual study in an area of special interest.

A program qualifying as Independent Study will consist of one or more courses in the 190–199 series. While the theme of such a program may be reasonably broad, a recognizable common thread should unite all the academic work you undertake during an independent study quarter. Regularly offered formal courses will only be acceptable as a part of such a program if they clearly fit its theme and contribute something essential toward the realization of its objectives. The program is not to be considered a way to take more variable-unit courses than normally permitted.

The procedure for enrolling in an Independent Study Program is as follows:

(1) Develop, in general terms, a plan of study;
(2) Locate a faculty sponsor or panel of sponsors and with their help and approval develop a detailed plan;
(3) Complete a project proposal form (obtained from the Academic Senate office) and submit it to the Academic Senate Committee on Courses of Instruction.

The deadline for applications is the tenth day of instruction of the term before; see the Academic Calendar, on page 1, for specific dates.

You must report the completion or termination of the project to the Committee on Courses of Instruction.

Individual Major

(College of Agricultural and Environmental Sciences, College of Biological Sciences, and College of Letters and Science)

The Major Program

The Individual Major, an integrated program composed of courses from two or more disciplines, is designed by the student and is subject to approval by faculty advisers and appropriate college committees. This major enables a student to pursue a specific interest that cannot be accommodated within the framework of an existing major. It must clearly and specifically meet the student's educational goals as well as meet university and college academic standards.

College of Agricultural and Environmental Sciences

The Individual Major in this College has been suspended indefinitely.

Program Office. 150 Mrak Hall
(530) 752-0108
http://caes.ucdavis.edu/StudInfo/Advising/undergraduate-advising

Student Proposal. An Individual Major may be organized by a student having a specific academic interest not represented by an established major. Each student wishing an Individual Major should submit a proposal to the Dean's Office, prior to reaching 120 units, for review by the Student Actions and Individual Major Subcommittee. This proposal must include *(1)* an essay describing the special educational aims of the student, including a statement indicating why the educational objectives cannot be met by existing majors; *(2)* a list of planned courses; and *(3)* faculty adviser recommendations. It is critical that students contact a college counselor in the Dean's Office for consultation and development of the proposal.

UNITS

Preparatory Subject Matter..... (variable)
Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter 45-54
Upper division course work must include:
(a) Interrelated courses of 45 upper division units from two or more areas of study;
(b) At least one of the two or more areas of study must be within the College of Agricultural and Environmental Sciences;
(c) At least 30 of the 45 upper division units that are required in the program must be taken from courses provided by the College of Agricultural and Environmental Sciences.

Unrestricted Electives ..... (variable)

Total Units for the Major 45-54

Master Adviser. Thomas Gordon, Ph.D. *(Plant Pathology)*

College of Biological Sciences

Program Office. 202 Life Sciences
(530) 752-0410

Student Proposal. A student who wishes to propose an individual major must submit the proposal to the Committee on Undergraduate Student Petitions prior to reaching 120 units. It is important for the student to make arrangements to speak with a counselor in the college early in the development of his/her major as no individual major will be approved after a student has completed 120 units.

A.B. and B.S. Major Requirements:

UNITS

Preparatory Subject Matter..... (variable)
Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements as determined by the Committee on Undergraduate Student Petitions.

Depth Subject Matter .... 45 units minimum
Upper division course work must include:
(a) at least 30 units from courses offered by departments in the College of Biological Sciences;
(b) additional requirements as determined by the Committee on Undergraduate Student Petitions. See the Dean's Office for details.
(c) for the B.A. degree, a maximum of 80 units toward the major; for the B.S. degree, a maximum of 110 units toward the major.

All University, General Education, and College of Biological Sciences Bachelor's degree requirements ..... (variable)

Total Units for the Degree 180

Principal Adviser (selected by student). A faculty member in a department or program in the College of Biological Sciences.

College of Letters and Science

Program Office. 200 Social Sciences and Humanities Building (Undergraduate Education and Advising office); *http://www.ls.ucdavis.edu/students*

Committee in Charge

James Ames, Ph.D. *(Chemistry)*
Karen L. Bales, Ph.D., Chairperson *(Psychology)*
Shelley Blozis, Ph.D. *(Psychology)*
Hearne Pardee, M.F.A. *(Art)*
Jon Rossini, Ph.D. *(Theatre and Dance)*

Student Proposal. A student who wishes to propose an individual major must submit the proposal to the Faculty Committee on Individual Majors in the College of Letters and Science prior to reaching 120 units. The proposal must be submitted by the end of the fourth week of the quarter. This proposal will consist of *(1)* an essay, identifying the specific educational and professional objectives, including an indication of why the objectives cannot be met within existing majors, *(2)* a list of courses planned to complete the major, and *(3)* faculty adviser recommendations. The proposal will be reviewed and a decision provided the quarter of submittal. It is important for you to make arrangements to speak with a counselor in the college early in the development of your major.

A.B. and B.S. Major Requirements:

UNITS

Preparatory Subject Matter..... (variable)

Lower division courses basic to the program or needed to satisfy prerequisites for upper division requirements.

Depth Subject Matter 45-54

Upper division units must include:
(a) interrelated and complementary courses from two or more departments which provide a unified pattern and focus;
(b) at least 30 units from Letters and Science teaching departments or programs;
(c) no more than 10 units in courses numbered 194H, 198 and 199;
(d) for the A.B. degree, a maximum of 80 units toward the major; for the B.S. degree, a maximum of 110 units toward the major.

Total Units for Degree 180

Major Advisers (selected by student). Principal Adviser: a faculty member in a teaching department or program in the College of Letters and Science in major field of emphasis. Secondary Adviser: a faculty member from secondary area of interest.

Honors Program. By the fourth week of the last quarter of the junior year, students potentially eligible for high or highest honors at graduation (see College section), may petition the Individual Majors Committee for tentative acceptance into an honors program.

Final admission will depend upon the Committee's approval of a senior thesis prospectus that has been agreed upon by the student and faculty adviser. The prospectus must be presented to the Committee by the end of the fourth full week of instruction of the first quarter of the senior year. Graduation with high or highest honors will be conditional upon both the maintenance of the required grade point average and the completion of the senior thesis project. Students who anticipate doing a senior honors thesis should allow up to 3 units of independent study in the program during each of two quarters in the senior year as course options.

Integrated Pest Management (A Graduate Group)

Howard Ferris, Ph.D., Chairperson of the Group

Group Office. 367 Briggs Hall (530) 752-0475

Faculty. Includes faculty members from the Colleges of Agricultural and Environmental Sciences and Letters and Science.

Graduate Study. The Graduate Group in Integrated Pest Management offers programs of study and research leading to the M.S. degree. Students may conduct independent research or participate in on-going projects on integrated crop management and sustainable agriculture. Weeds, insects, plant pathogens, nematodes, rodents, and other pests are treated as parts of complex ecosystems and not as isolated problems. Courses include concepts and systems of plant protection and pest management, diagnosis and control of plant pest problems, toxicology and legal ramifications, and equipment for pest control operations. Detailed information can be obtained from the Group Chairperson and the application for Graduate Admission and Fellowship.

Graduate Adviser. Jay Rosenheim *(Entomology)*

Courses in Integrated Pest Management (IPM)

Graduate Courses

201. Concepts and Systems of Plant Protection and Pest Management (4)
Lecture—2 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: Agricultural Systems and Environment 120, Entomology 110, Plant Pathology 120, Plant Biology 120 (may be taken concurrently), Nematology 100; Plant Biology 117 or Evolution and Ecology 101 recommended. Ecological perspectives of agricultural systems, the role of pests and pest management in these systems, and the monitoring and modeling of the systems. Offered in alternate years.—(II.)

202A-202B. Diagnosis of Plant Pest Problems and the Control of Causal Agents (4-4)
Discussion—1 hour; fieldwork—9 hours. Prerequisite: Entomology 110, Plant Pathology 120, Plant Biology 120, Nematology 100 (may be taken concurrently). Problems and assessment of losses caused by in-sects, pathogens, weeds, nematodes, and other pests. Methods of determining infestation levels and establishing economic thresholds, and control of these pests with emphasis on integration of available management practices into programs.—I-III. (I-III.) Rosenheim

290. Seminar (1-2)
(S/U grading only.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Integrated Studies Honors Program

James F. Shackelford, Ph.D., Program Director

Program Office. 1530 Surge III; (530) 752-9760; *http://integratedstudies.ucdavis.edu*

Faculty

John Boe, Ph.D., Lecturer
(University Writing Program)
Catherine Chin, Ph.D. Assistant Professor *(Religion)*
Evan Fletcher, Ph.D., Lecturer
(Center for Neuroscience)
Frank Hirtz, Ph.D., Associate Professor
(Human and Community Development)
Robin Hill, B.F.A., Associate Professor
(Art and Art History)
Naomi Janowitz, Ph.D., Professor *(Religious Studies)*
Alessa Johns, Ph.D., Associate Professor *(English)*
Winder McConnell, Ph.D., Professor
(German and Russian)
Jade McCutcheon, Ph.D., Assistant Professor
(Theatre and Dance)
Sally McKee, Ph.D., Associate Professor *(History)*
Bella Merlin, Ph.D., Professor *(Theatre and Dance)*
Marco Molinaro, Ph.D., Lecturer
(Center for Biophotonics)
Martina Newell-McGloughlin, D.Sc., Lecturer
(UC Systemwide Biotechnology Research and Education Program)
Pablo Ortiz, D.M.A., Professor *(Music)*
Hearne Pardee, M.F.A., Assistant Professor
(Art and Art History)
Eric J. Schroeder, Ph.D., Lecturer
(University Writing Program)
Kenneth A. Shackel, Ph.D., Professor *(Pomology)*
Gina Werfel, M.F.A., Professor *(Art and Art History)*

The Program of Study

The Integrated Studies Honors Program, a part of the University Honors Program, is an invitational, first-year, residential honors program. Course offerings oriented toward undergraduate research opportunities are also offered beyond the freshman year. Established in 1969, the program aims to help high-achieving students integrate knowledge gained from their study of the humanities, natural sciences, and social sciences and expand their learning experiences through interdisciplinary or multidisciplinary courses. Enrollment is limited to 25 students per class, and program membership is limited to the top 5% of the entering class.

Freshmen enroll in two Integrated Studies Honors Program courses and two seminars during the year. Students not admitted to the Program may not register for Integrated Studies Honors Program courses or seminars. Sophomores and Regents Scholars who receive that award as a junior enroll in three seminars during the year (IST 90, IST 94, and IST 190). Juniors and Seniors enroll in IST 194HA, HB and IST 190.

Courses in Integrated Studies (IST)

Lower Division Courses

8. Colloquium (1)
Discussion—1 hour. Lectures, films, and readings on the interrelation between the arts and sciences. May be repeated for credit. (P/NP grading only.)—I. (I.)

8A. Special Topics in Natural Science and Mathematics (4)
Lecture—3 hours; discussion—1 hour. Group study of a special topic in natural sciences and mathematics. Course varies with topic offered. Limited enrollment. May be repeated for credit. GE credit: SciEng, Wrt.—I, II, III. (I, II, III.)

8B. Special Topics in Humanities (4)
Lecture—3 hours; discussion—1 hour. Group study of a special topic in humanities. Course varies with topic offered. Limited enrollment. May be repeated for credit. GE credit: ArtHum, Wrt.—I, II, III. (I, II, III.)

8C. Special Topics in the Social Sciences (4)
Lecture—3 hours; discussion—1 hour. Group study of a special topic in social sciences. Course varies with topic offered. Limited enrollment. May be repeated for credit. GE credit: SocSci, Wrt.—I, II, III. (I, II, III.)

9. Seminar (1)
Lecture—1 hour. Preparation of a research report. Normally taken with course 8. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

90. Seminar (1)
Seminar—1 hour. Prerequisite: course 9; consent of instructor; completion of 45 units with a minimum GPA of 3.250. Interrelation between the arts and sciences, focusing on a special topic. Limited to sophomores who participated in the Integrated Studies

Honors Program during their freshman year and transfer students by consent of instructor. (P/NP grading only.)—I. (I.)

94. Seminar (1)
Seminar—1 hour. Prerequisite: course 9, consent of instructor and completion of 45 units with a minimum GPA of 3.500; restricted to sophomores who participated in the Integrated Studies Honors Program during their freshman year and other students by consent of instructor. The nature of research at the undergraduate level. (P/NP grading only.)

Upper Division Courses

190. Topics in Integrated Studies (1)
Seminar—1 hour. Prerequisite: course 9. Discussion of the integration of the arts and sciences, focusing on a special topic. May be repeated three times for credit when topic differs. (P/NP grading only.) Not offered every year.

194HA. Special Study for Honors Students (4)
Independent study—3 hours; seminar—1 hour. Prerequisite: course 9, consent of instructor and completion of 90 units with a minimum GPA of 3.500. A program of research culminating in the writing of a junior honors thesis under the direction of a faculty adviser. May be repeated one time for credit. (Deferred grading only, pending completion of sequence.)—I-II. (I-II.)

194HB. Special Study for Honors Students (4)
Independent study—3 hours; seminar—1 hour. Prerequisite: course 9, consent of instructor and completion of 90 units with a minimum GPA of 3.500. A program of research culminating in the writing of a junior honors thesis under the direction of a faculty adviser. May be repeated one time for credit. (Deferred grading only, pending completion of sequence.)—II. (II.)

197T. Tutoring in Integrated Studies (1-4)
Tutorial—1 hour. Prerequisite: consent of Director of Integrated Studies Honors Program. Tutoring in Integrated Studies courses, usually in small discussion groups. Weekly discussions with the instructor on the subject matter of the course being tutored and on the art and craft of teaching. May be repeated eight times for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

Interior Design

See Design, on page 210.

Internal Medicine

See Medicine, School of, on page 380.

International Agricultural Development

(College of Agricultural and Environmental Sciences)

International Agricultural Development is an interdisciplinary major in the Human and Community Development department.

Faculty. Includes members from various departments across colleges.

The Major Program

The goal of international agricultural development is to improve food production, nutrition, marketing, and health in less technically advanced countries. Students in this major are trained in technical areas of agriculture that can be applied to the problems of world hunger and health.

The Program. Principle subjects of study within the major are Agricultural Production, Economic Development, Environmental Issues, Nutrition, Rural Communities, and Trade and Commodity Development. Courses are in social sciences, humanities, and economic environments in which agriculture operates in countries outside the United States.

Career Alternatives. The study of international agricultural development prepares a student for a variety of careers. Some students choose service through the Peace Corps. Others seek employment in international trade, while others choose to work for a governmental or private agency in a foreign nation. Religious groups and organizations also employ university-trained individuals for agricultural work in conjunction with missions and other types of human service work overseas. The major is also preparation for further graduate work in agricultural development.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 47
Choose 47 units from either the Social Science or Natural Science core in consultation with adviser.
Social Sciences core: Agricultural and Resource Economics 15; Plant Sciences 1; Animal Science 41 and 41L or Plant Sciences 2; Chemistry 10; Community and Regional Development 1; Economics 1A and 1B; International Agricultural Development 10; Mathematics 16A and 16B; Nutrition 10 or 20; Sociology 1 or Anthropology 2; Soil Science 10; Statistics 13 or Sociology 46B
Natural Science core: Animal Science 41 and 41L or Plant Sciences 2; Biological Sciences 2A and 2B or 2A and 2C; Chemistry 2A and 2B; Chemistry 8A and 8B or Physics 1A and 1B; Economics 1A or Agricultural and Resource Economics 15; International Agricultural Development 10; Mathematics 16A and 16B; Nutrition 10 or 20; Soil Science 10 or 100; Statistics 13

Depth Subject Matter 36-37
Agricultural and Resource Economics 147 or Plant Sciences 101 or Geography 161 4
Economics 115A 4
International Agricultural Development 142 or 160 2-3
International Agricultural Development 103 and International Agricultural Development 170 8
Sociology 170 4
Plant Sciences 110A, 110C, or 135; Plant Sciences 142 3-4
Community and Regional Development 142 or 152 4
Political Science 123 or 124 or Sociology 145A 4
Textiles and Clothing 174 3

Foreign Language Requirement 0-15
Students must complete 15-unit level in one language or pass the foreign language proficiency examination. A score of 5, 4, or 3 on a foreign language College Board Advanced Placement Examination (except Latin) or a score of 550 on the College Board SAT II: Subject Test will also satisfy this requirement.

Internship Requirement 4-8
Students must complete at least 4 units of internship and may use up to 8 units toward major requirements. Internships can be chosen in consultation with an adviser. Internship requirement waived for students enrolled in the UC Education Abroad Program.

Areas of Specialization 30-35

Agricultural Production Option:
Agricultural and Resource Economics 140, Plant Sciences 101 and 105 or Animal Genetics 107
Additional 14-15 units of restricted electives in consultation with an adviser.

Economic Development Option:
Agricultural and Resource Economics 100A and 100B, Economics 115B
Agricultural and Resource Economics 120, 130, 140, 175 and International Agricultural Development 195A or 195B

Environmental Issues Option:
Students must consult with a faculty adviser to identify an emphasis within the option and to select suitable courses.
Environmental Science and Policy 100 or 110, 160, 171 and Plant Biology 151
Agricultural and Resource Economics 147, Plant Sciences 101, Environmental Horticulture 150, Environmental Science and Policy 161, 175 and International Agricultural Development 195A

Rural Communities Option:
Community and Regional Development 140, 151, 151L, 152, 154
Community and Regional Development 164 or 172, International Agricultural Development 195A, additional restricted electives chosen in consultation with an adviser

Trade and Development in Agricultural Commodities Option:
Agricultural and Resource Economics 100A, 113, 130, Plant Biology 172
Agricultural and Resource Economics 138, Economics 160A, 160B, Food Science and Technology 100A, 109, 160, International Agricultural Development 195A, Textiles and Clothing 162, 163

Total Units for Major 117-142

International Agricultural Development Abroad 0-20
A maximum of five courses abroad, selected with approval of an adviser, may be applied toward the 12 upper division courses in the major.

Specialization Advisers
A listing of faculty in the various areas of specialization and with interests in International Agricultural Development is available from the Major Adviser.

Major Adviser. F. Hirtz *(Human and Community Development)*

Minor Program Requirements:

UNITS

International Agricultural Development 21-23
International Agricultural Development 10 and Agricultural and Resource Economics 115A 8

Plant Sciences 101, 110A, 110C, 112..... 6-7
International Agricultural Development 103, 170, 195A or Community and Regional Development 142 7-8

Minor Adviser. F. Hirtz in 1333 Hart Hall

Graduate Study. A program of study and research leading to the M.S. degree is available in International Agricultural Development. Detailed information regarding graduate study may be obtained by writing to the Graduate Program Coordinator for IAD (*dddamanchyk@ucdavis.edu*) or visiting the Graduate Studies' website at *http://www.gradstudies.ucdavis.edu/programs/program_detail.cfm?id=57*.

Graduate Advisers. Richard E. Plant *(Plant Sciences)*, Stephen Boucher *(Agricultural and Resource Economics)*, Patrick Brown *(Plant Sciences)*, Paul L. Gepts *(Plant Sciences)*, Frank Hirtz *(Human and Community Development)*

Related Courses. See Agricultural and Resource Economics 148, 215C, Agricultural Management and Rangeland Resources 111, Anthropology 221, Economics 115A-115B, 215A-215B-215C, Geography 142, Nutrition 20, Sociology 144.

Courses in International Agricultural Development (IAD)

Questions pertaining to the following courses should be directed to the instructor or to the Department of Human and Community Development Advising Center in 1303 Hart Hall (530) 752-2244.

Lower Division Courses

10. Introduction to International Agricultural Development (4)
Lecture—3 hours; discussion—1 hour. Theories, practices and institutions relating to agricultural development; the interaction of changing social, cultural and economic organization through successive stages of economic development; impact of new agricultural technology on underdeveloped regions. GE credit: SocSci, Div, Wrt.—II.

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

Upper Division Courses

103. Social Change and Agricultural Development (4)
Lecture/discussion—4 hours. Prerequisite: introductory social science course (Anthropology, Sociology, Economics, International Agricultural Development). How social and cultural factors influence technological change in agriculture; theories of diffusion of innovations; social impact analysis and technology assessment. GE credit: SocSci, Div.—II.

142. Equipment and Technology for Small Farms (2)
Lecture—1 hour; laboratory—3 hours. Types and characteristics of agricultural equipment and technologies appropriate for small commercial farming. Adjustment and calibration of equipment. Selection of and budgeting for equipment. (Same course as Applied Biological Systems Technology 142.)

160. Agroforestry: Global and Local Perspectives (3)
Lecture/discussion—3 hours. Prerequisite: Plant Sciences 2 or Biological Sciences 1C; Plant Biology 142 or a general ecology course (Environmental Science and Policy 100). Traditional and evolving use of trees in agricultural ecosystems; their multiple roles in environmental stabilization and production of food, fuel, and fiber; and socioeconomic barriers to the adoption and implementation of agroforestry practices. Not open for credit to students who have taken Agricultural Management and Rangeland Resources 160. (Same course as Plant Sciences 160.) Offered in alternate years.—I. Gradziel

162. Field Course in Tropical Ecology and Sustainable Agricultural Development (8)
Lecture—20 hours; discussion—10 hours; field work—30 hours. Prerequisite: consent of the instructor; Biological Sciences 1C required; Biological Sciences 1A or 1B or course 10 recommended; limited enrollment, acceptance based on academic merit, personal experience, and academic discipline in order to provide a multidisciplinary atmosphere. International Field Course. Tropical Ecology of various ecosystems; Agricultural systems in the tropics; Sustainable agriculture uniting ecology and agriculture, language and culture, trips to field research stations and ecotourism field trips required. No credit given to students who have taken Pomology 162. GE credit: Div, SciEng, Wrt.—IV. (IV.)

170. Program Development for International Agriculture (4)
Lecture/discussion—4 hours. Prerequisite: course 10. Principles of leadership and management for international agricultural development. Organizations and organizational behavior, and the implications for planning and administering organizations involved in the global development effort.—II. (III.) Marcotte

190. Proseminar in International Agricultural Development (1)
Seminar—1 hour. Presentation and discussion of current topics in international agricultural development by visiting lecturers, staff and students. May be repeated for credit. (P/NP grading only.)

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

195A. Field Study in Agricultural Development—California (3)
Lecture—2 hours total; seminar—8 hours total; fieldwork—four 2-day visits. Prerequisite: consent of instructor. Students will incur travel expenses. Observation of agricultural development strategies and effects on rural communities. Discussion with farmers, workers and organizational staff members. Study of farm commodities, institutions and experiences in dealing with agricultural development problems. International influence on U.S. agriculture. (P/NP grading only.)—III. Marcotte

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

200N. Philosophy and Practice of Agricultural Development (5)
Lecture/discussion—5 hours; term paper. Introduction to key elements of the philosophy and practice of agricultural development in less developed countries. Introduction to the major paradigms of development, the historical context within which these paradigms have operated, and the various development techniques and initiatives that have emerged from agricultural production to institutional capacity building and management. Not open for credit to students who have completed former course 202.—I. (I.) Marcotte

201. The Economics of Small Farms and Farming Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics 100A. Economic perspective on small farm development. Establishes a basis for predicting farmers' responses to changes in the economic environment, and for proposing government policies to increase small farm production and improve farmer and national welfare.—II. (II.) Vosti

202N. Analysis and Determinants of Farming Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Sciences 150 or the equivalent. The unifying concepts of cropping systems in temperate and tropical climatic zones; agroecosystems stability, diversity and sustainability; management strategies, resource use efficiency and their interactions; the role of animals, their impact on energy use efficiency, nutrient cycling, and providing food and power. Not open for credit to students who have completed former course 200.—III. (III.) Van Kessel, Pittroff

203N. Project Planning and Evaluation (4)
Discussion—1 hour; workshop—3 hours. Prerequisite: courses 200N (or former course 202), 201, 202N (or former course 200). Interdisciplinary setting for application of student skills and specialization to a "real world" development project. Focus on team-building and effective interdisciplinary problem-solving methods, with the objective of producing a project document and presentation within a specified deadline. Not open for credit to students who have completed former course 203.—III. (III.) Brown, Gepts, Piedrahita

217. Conservation and Sustainable Development in Third World Nations (4)
Lecture/discussion—3 hours; fieldwork—2 hours. Prerequisite: at least one course from two of these three groups: a) Environmental Science and Policy 160, 161, 168A, 168B; b) Environmental Science and Policy 101, 133, International Agricultural Development 103, Geography 142; c) Anthropology 126, 131, Geography 141, Sociology 144, 145A, 145B. Examination of the patterns of resource ownership, control and management in agricultural lands, extractive zones (fisheries, forests) and wildlands, with emphases on conservation and sustainability. Comparison of industrial democracies and poorer nations. (Same course as Ecology 217.) Offered in alternate years.—Orlove

220. Food and Nutrition Strategies in Developing Countries (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural and Resource Economics 100A. Identifies important topical problems in food and nutrition policy, develops theoretical frameworks suitable for their analysis, examines the empirical information relevant to the problems and, using theory data, draws appropriate policy implications. Offered in alternate years.—III. Jarvis

290. Seminar in International Agricultural Development (1-2)
Seminar—1-2 hours. Prerequisite: consent of instructor. Discussion and critical evaluation of advanced topics and issues in international agricultural development. May be repeated for credit. (S/U grading only.)—III. Brown, Van Horn

291. Topics in International Agricultural Development (1-3)
Lecture/discussion—1-3 hours. Prerequisite: consent of instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations. Variable content. May be repeated one time for credit.

292. Graduate Internship (1-12)
Internship—3-36 hours. Prerequisite: participation in H. Humphrey Fellow Program or consent of instructor. Individually designed supervised internship, off or on campus, in community, business or institutional setting. Developed with advice of faculty mentor and Humphrey Coordinator. (S/U grading only.)

298. Directed Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

International Agricultural Development (A Graduate Group)

Richard E. Plant, Ph.D. *(Plant Sciences)*, Chairperson of the Group

Group Office. 205 Hunt Hall
(530) 754-4424; *http://iad.ucdavis.edu*

Faculty

Diane M. Barrett, Ph.D., Specialist in Cooperative Extension *(Food Science and Technology)*
Mark Bell, Ph.D., Lecturer *(Plant Sciences)*
Stephen Boucher, Ph.D., Assistant Professor *(Agricultural and Resource Economics)*
Kenneth H. Brown, Ph.D., Professor *(Food Science and Technology)*
Patrick H. Brown, Ph.D., Professor *(Plant Sciences)*
Stephen B. Brush, Ph.D., Professor *(Human and Community Development)*
Marita Cantwell-De-Trejo, Ph.D., Specialist in Cooperative Extension, and Lecturer *(Food Science and Technology)*
Tim E. Carpenter, Ph.D., Professor *(Medicine and Epidemiology)*
Colin A. Carter, Ph.D., Professor *(Agricultural and Resource Economics)*
Michael R. Carter, Ph.D., Professor *(Agricultural and Resource Economics)*
Patricia A. Conrad, D.V.M., Ph.D., Professor *(Pathology, Microbiology, and Immunology)*
Montague W. Demment, Ph.D., Professor *(Plant Sciences)*
Johannes J. DeVries, Ph.D., Lecturer *(Civil and Environmental Engineering)*
Kathryn G. Dewey, Ph.D., Professor *(Nutrition)*
Serge I. Doroshov, Ph.D., Professor *(Animal Science)*
Richard Evans, Ph.D., Specialist in Cooperative Extension *(Plant Sciences)*
James Fadel, Ph.D., Professor *(Animal Science)*
Steven Fennimore, Ph.D., Cooperative Extension Specialist *(Plant Sciences)*
Louise Ferguson, Ph.D., Specialist in Cooperative Specialist *(Plant Sciences)*
Howard Ferris, Ph.D., Professor *(Nematology)*
Albert Fischer, Ph.D., Professor *(Plant Sciences)*
Ryan E. Galt, Ph.D., Assistant Professor *(Human and Community Development)*
Shu Geng, Ph.D., Professor *(Plant Sciences)*
Paul L. Gepts, Ph.D., Professor *(Plant Sciences)*
Robert Gilbertson, Ph.D., Professor *(Plant Pathology)*
John S. Glenn, D.V.M., Ph.D., Extension Veterinarian *(Veterinary Medicine)*
Barbara G. Goldman, Ph.D., Lecturer *(Education)*
Rachael Goodhue, Ph.D., Associate Professor *(Agricultural and Resource Economics)*
Thomas Gradziel, Ph.D., Professor *(Plant Sciences)*
Richard D. Green, Ph.D., Professor *(Agricultural and Resource Economics)*
Luis Guarnizo, Ph.D., Associate Professor *(Human and Community Development)*
Bruce R. Hartsough, Ph.D., Professor *(Biological and Agricultural Engineering)*
Timothy K. Hartz, Ph.D., Specialist in Cooperative Extension and Lecturer *(Plant Science)*
James Hill, Ph.D., Specialist in Cooperative Extension and Lecturer *(Plant Sciences)*
Robert Hijmans, Ph.D., Assistant Professor *(Environmental Science and Policy)*
Frank W. Hirtz, Ph.D., Associate Professor *(Human and Community Development)*
William Horwath, Ph.D., Professor *(Land, Air and Water Resources)*
Theodore Hsiao, Ph.D., Professor *(Land, Air and Water Resources)*
Silas S. O. Hung, Ph.D., Professor *(Animal Science)*
Lovell S. Jarvis, Ph.D., Professor *(Agricultural and Resource Economics)*
Bryan M. Jenkins, Ph.D., Professor *(Biological and Agricultural Engineering)*
Marion Jenkins, Ph.D., Research Engineer *(Civil and Environmental Engineering)*
Suad Joseph, Ph.D., Professor *(Anthropology, Women and Gender Studies)*
Katrina Jessoe, Ph.D., Assistant Professor *(Agricultural and Resource Economics)*
Lucia Kaiser, Ph.D., Associate Specialist in Cooperative Extension *(Nutrition)*
Martin Kenney, Ph.D. Professor *(Human and Community Development)*
Emilio A. Laca, Ph.D., Associate Professor *(Plant Sciences)*
W. Thomas Lanini, Ph.D., Specialist in Cooperative Extension and Lecturer *(Plant Sciences)*
Jonathan London, Ph.D., Assistant Professor *(Human and Community Development)*
Jay Lund, Ph.D., Professor *(Civil and Environmental Engineering)*
Travis Lybbert, Ph.D., Assistant Professor *(Agricultural and Resource Economics)*
E. Dean MacCannell, Ph.D., Professor *(Environmental Design)*
Paul Marcotte, Ph.D., Lecturer *(Human and Community Development)*
Miguel A. Marino, Ph.D., Professor *(Land, Air and Water Resources; Civil and Environmental Engineering)*
Philip E. Martin, Ph.D., Professor *(Agricultural and Resource Economics)*
Mark A. Matthews, Ph.D., Professor *(Viticulture and Enology)*
Jeffrey P. Mitchell, Ph.D., Specialist in Cooperative Extension and Lecturer *(Plant Sciences)*
Donald Nevins, Ph.D., Professor *(Plant Sciences)*
Benjamin Orlove, Ph.D., Professor *(Environmental Science and Policy)*
Raul H. Piedrahita, Ph.D., Professor *(Biological and Agricultural Engineering)*
Dan Potter, Ph.D., Professor *(Plant Sciences)*
Daniel Putnam, Ph.D., Cooperative Extension Specialist, Agronomist and Lecturer *(Plant Sciences)*
Michael S. Reid, Ph.D., Professor *(Plant Sciences)*
Eliska Rejmankova, Ph.D., Professor *(Environmental Science and Policy)*
Pete Richerson, Ph.D., Professor *(Environmental Science and Policy)*
Pamela C. Ronald, Ph.D., Professor *(Plant Pathology)*
Scott Rozelle, Ph.D., Adjunct Professor *(Agricultural and Resource Economics)*
Roberto D. Sainz, Ph.D., Professor *(Animal Science)*
Richard Sexton, Ph.D., Professor *(Agricultural and Resource Economics)*
Rajinder Paul Singh, Ph.D., Professor *(Biological and Agricultural Engineering)*
Johan Six, Ph.D., Assistant Professor *(Plant Sciences)*
Michael P. Smith, Ph.D., Professor *(Human and Community Development)*
Randal Southard, Ph.D., Professor *(Land, Air and Water Resources)*
Christine Stewart, Ph.D., Assistant Professor *(Nutrition)*
Daniel A. Sumner, Ph.D., Professor *(Agricultural and Resource Economics)*
J. Edward Taylor, Ph.D., Professor *(Agricultural and Resource Economics)*
Steven R. Temple, Ph.D., Specialist in Cooperative Extension and Lecturer *(Plant Sciences)*
Larry R. Teuber, Ph.D., Professor *(Plant Sciences)*
Tom Tomich, Ph.D., Director *(Sustainable Agriculture Research and Education Program)*
Cary Trexler, Ph.D., Assistant Professor *(School of Education)*
Mark Van Horn, M.Sci., Lecturer *(Plant Sciences)*
Chris van Kessel, Ph.D., Professor *(Plant Sciences)*
Stephen Vosti, Ph.D., Associate Adjunct Professor *(Agricultural and Resource Economics)*
Karen Watson-Gegeo, Ph.D., Professor *(School of Education) Distinguished Graduate Mentoring Award*
Bruce Winterhalder, Ph.D., Professor *(Anthropology)*
Diane L. Wolf, Ph.D., Professor *(Sociology)*
Joshua Viers, Ph.D., Associate Research Ecologist *(Environmental Science and Policy*
Aram A. Yengoyan, Ph.D., Professor *(Anthropology)*
Tilahun D. Yilma, Ph.D., Professor *(Pathology, Microbiology, and Immunology)*
Glenn Young, Ph.D., Associate Professor *(Food Science and Technology)*
Truman P. Young, Ph.D., Professor *(Plant Sciences)*
Frank G. Zalom, Ph.D., Specialist in Cooperative Extension and Lecturer *(Entomology)*
Minghua Zhang, Ph.D., Associate Adjunct Professor *(Land, Air and Water Resources)*
Ruihong Zhang, Ph.D., Professor *(Biological and Agricultural Engineering)*
Richard A. Zinn, Ph.D., Professor *(Animal Science)*

Emeriti Faculty

David Boyd, Ph.D., Professor Emeritus (Anthropology)
Theodore C. Foin, Ph.D., Professor Emeritus *(Plant Sciences)*
Isao Fujimoto, M.A., Lecturer Emeritus *(Human and Community Development)*
James I. Grieshop, Ph.D., Specialist Emeritus in Cooperative Extension *(Human and Community Development)*
Louis E. Grivetti, Ph.D., Professor Emeritus *(Nutrition)*
Theodore C. Hsiao, Ph.D., Professor Emeritus *(Land, Air and Water Resources)*
Janet D. Momsen, Ph.D., Professor Emeritus *(Human and Community Development)*
Ernesto Pollitt, Ph.D., Professor Emeritus *(Nutrition, Pediatrics)*
D. William Rains, Ph.D., Professor Emeritus *(Plant Sciences)*
Alvin D. Sokolow, Ph.D., Specialist in Cooperative Extension Emeritus *(Human and Community Development)*
Ronald E. Voss, Ph.D., Specialist in Cooperative Extension Emeritus *(Plant Sciences)*
Steven Weinbaum, Ph.D., Professor Emeritus *(Plant Sciences)*
Miriam J. Wells, Ph.D., Professor Emeritus *(Human and Community Development)*

Graduate Study. The International Agricultural Development M.S. degree program prepares students for careers in global agricultural and rural development, especially, but not exclusively, of developing and less-industrialized regions. This is an interdisciplinary program designed to provide students with knowledge and skills that will enable them to implement, facilitate, and manage programs that enhance agricultural development, resource management, and rural life.

Students are prepared to realize biological and technological improvement in agricultural and natural systems to facilitate social innovation. Training in International Agricultural Development includes both breadth and depth components. Breadth components, required of all M.S. students, aim to establish an understanding of the issues in international development as they relate to agriculture and the environment. These include the history and philosophy of development, leadership and management techniques, fundamentals of farming systems, and agricultural economics. Students acquire depth in their own areas of specialization within the agricultural and social sciences. The areas include agricultural and resource economics, agricultural engineering, agronomy, animal science, anthropology, aquaculture, avian science, community development, ecology, economics, entomology, environmental design, environmental toxicology, food science, gender, geography, horticulture, nutrition, plant pathology, plant biology, plant protection and pest management, political science, preventive veterinary medicine, range science, sociology, soil science, sustainable agriculture, vegetable crops, viticulture, and water science.

Practical and on-site experience with development issues is encouraged and facilitated by guidance from the group's approximately 80 faculty members, who posses a wide range of experience in international development.

Graduate Adviser. Contact the Group office.

International Commercial Law (A Graduate Group)

Daniel L. Simmons, J.D., Chairperson of the Group

Beth Greenwood, J.D., Director, International Programs, UC Davis School of Law

Group Office. International Law Programs, School of Law & UC Davis Extension, 1333 Research Park Drive, Davis, CA 95618 (530) 757-8569;
lawinfo@ucde.ucdavis.edu
http://www.law.ucdavis.edu/international

Faculty

Courses are taught by School of Law faculty from UC Davis and other University of California law schools, the Graduate School of Management, Departments of Economics and Agricultural and Resource Economics. Additionally, outstanding practitioners from private practice and government—lawyers, economists, bankers, businessmen—have acted as adjunct faculty to provide an applied perspective through lectures, simulations and case studies.

Graduate Study

The Graduate Group in International Commercial Law offers a program of study and research leading to the LL.M.degree through a summer only program. Students are required to take 36 quarter units of study over two, three, four, or five summers. Thirty of the units must be UC Davis courses. Six units may be completed in another country with the approval of the Director of the ICL program. The classes are taught in an intensive format of 20 hours per week or four hours per day, two hours of lecture in the morning, two hours in the afternoon. Students complete four core courses, starting with the Orientation to U.S.A. Law and followed by three specialized core courses in international commercial law. Elective courses then provide in-depth study in focused topics such as private international law, conflict of laws, intellectual property, business associations, antitrust, tax, securities and finance and the like. Students also complete a research paper.

Preparation

Foreign applicants must present satisfactory evidence of the completion of legal academic training at an accredited educational institution. Domestic applicants must have completed at least six years of resident study at accredited colleges and law schools and must hold a professional degree from a law school approved by the American Bar Association.

Graduate Advisors. Beth Greenwood *(International Programs, School of Law),* Dan Simmons *(School of Law)*

Courses in International Commercial Law (ICL)

ICL courses are taught in an intensive format during the summer quarter. For more information, contact the International Law Programs at (530) 757-8569 or e-mail at *lawinfo@ucde.ucdavis.edu*.

Graduate Courses

201. Orientation in United States Law (7)
Lecture/discussion—20 hours. Prerequisite: law school education or the equivalent. Investigation of the Common Law System of the United States. Includes structure of the U.S. government, Constitutional law, contracts, torts, real property, consumer law, securities law, intellectual property, antitrust, taxation, labor law, environmental law, ethics, remedies, legal research and trial practice.

202. Introduction to Contracts (4)
Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Examines sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and noncommercial transactions. Inquiry is made into the means by which traditional doctrine adjusts to changing social demands. Offered irregularly.—IV.

203. Civil Procedure (2)
Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes. Offered irregularly.—IV.

204. International Joint Ventures (3)
Lecture/discussion—20 hours. Prerequisite: course 201, law school education or the equivalent. International and U.S. business and legal transactions. Legal planning, problem solving, decision making and negotiations related to the break-up and dissolution of a major international joint venture. U.S. laws including finance, tax, bankruptcy, labor, antitrust, environmental, corporate structures and intellectual property. Offered every three years.

205. Introduction to Constitutional Law (4)
Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Principles, doctrines and controversies regarding the structure and division of powers in American government. Includes judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among branches of the federal government. Offered irregularly.—IV.

211. Negotiations and Alternative Dispute Resolution (1)
Lecture/discussion—10 hours. Prerequisite: course 201, law school education or the equivalent. Mechanisms for resolving disputes including the alternatives to litigation such as negotiation, mediation, and arbitration. Advantages and disadvantages of each approach. Offered in alternate years.

212. Introduction to Negotiation (2)
Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Introduction to theoretical and empirical approaches to negotiation for the purposes of making deals and resolving legal disputes. Offered irregularly.—IV.

214. Advanced Negotiation (2)
Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Principles and empirical approaches to advanced negotiations including negotiation framework, models, styles, multiple party/issue negotiations and settlements. Offered irregularly.—IV.

215. Business Associations (4)
Lecture/discussion—20 hours. Prerequisite: course 201, law school education or the equivalent. Legal rules and concepts applicable to business associations including general partnerships, joint ventures, limited partnerships, limited liability entities, and sole proprietorships. Offered in alternate years.

216. International Business Transactions (2)
Lecture/discussion—20 hours. Prerequisite: course 201 and law school education or the equivalent. Legal problems arising from international business transactions. Focus on international sales contracts, choice of law, forum selection clauses, letters of credit, transfers of technology, regulation of bribery, development of joint ventures, repatriation of profits, foreign exchange problems, and national efforts to control imports. Offered in alternate years.

217. Alternative Dispute Resolution (2)
Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Introduces students to a wide variety of alternative dispute resolution procedures, with an in-depth emphasis on negotiation, mediation and arbitration. Offered irregularly.—IV.

219. Advanced Writing Project (4)
Project. Prerequisite: course 201, law school education or the equivalent. The completion of a written research project under the active supervision of a faculty member in satisfaction of the research-writing requirement. (S/U grading only.)

220. United States Taxation of Multinational Investments (2)
Lecture/discussion—20 hours. Prerequisite: course 201, law school education or the equivalent. An analysis of the United States taxation of multinational investments including jurisdiction of tax, the U.S. tax system, foreign tax credits, treaties, and transfer pricing. Offered in alternate years.

229. Criminal Procedure (2)
Lecture/discussion—20 hours. Prerequisite: Law school education or equivalent. Federal constitutional limits on government authority to gather evidence and investigate crime. Includes Fourth Amendment limits on search, seizure, and arrest; Fifth Amendment privilege against self-incrimination; Sixth Amendment right to counsel. Not offered every year.—IV.

236. United States Securities Law and Regulation (2)
Lecture/discussion—20 hours. Prerequisite: course 201, law school education or the equivalent. Structural and jurisdictional issues associated with securities practice. Topics include the regulation of public offerings, transactions by corporate insiders, regulation of corporate disclosure and conduct, and the liabilities of corporations and individuals under antifraud provisions. Offered in alternate years.

239. Mediation (2)
Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Introduction to the mediation process. Development of communication skills, the ability to analyze disputes, to understand why mediations succeed or fail, and understand the advantages and limitations of mediation as a method of resolving disputes. Offered irregularly.—IV.

242. Private International Law (2)
Lecture/discussion—20 hours. Prerequisite: course 201, law school education or equivalent. How law operates across national borders; emphasis on methods of resolving international disputes. International aspects of jurisdiction, choice of law, enforcement of judgments, choice of forum, service of process, taking of evidence, foreign sovereign immunity, extraterritorial regulation of antitrust, securities and other national laws. Offered in alternate years.—Bjorklund

247. Banking Law (1)
Lecture/discussion—10 hours. Prerequisite: course 201, law school education or the equivalent. Institutional features of international banking transactions, the structure of a large financial deal, and the mechanics of overseeing large loans. Emphasis on negotiable instruments such as bills of lading, letters of credit, standby letters of credit, and interbank transactions. Offered in alternate years.

249. Comparative Law (1)
Lecture/discussion—10 hours. Prerequisite: course 201 and law school education or the equivalent. A comparative study of the development of schools of legal thought, chiefly Common law systems and Civil law traditions. Attention to the historical reasons for their divergence, contemporary approaches to universal problems such as succession, torts, and contracts, the cross-fertilization of laws and difficulties commonly associated with importing foreign law into new territory. Offered in alternate years.

250. International Trade Law (3)
Lecture/discussion—20 hours. Prerequisite: course 201, law school education or the equivalent. An investigation of global trading systems including international trade in goods and services, e-commerce, international intellectual property, international tax planning and investment. Includes substantive and procedural provisions of the World

Trade Organization (WTO) and the North American Free Trade Agreement (NAFTA). Offered every three years.

251. United States Litigation Issues (1)
Lecture/discussion—10 hours. Prerequisite: course 201, law school education or the equivalent. Prevention and resolution of disputes in international commerce. Emphasis on preparing for a trial in the United States. Includes the study of pre-trial motions, jury selection, opening statements, rules of evidence, closing arguments, and the selection of appropriate strategies. Offered in alternate years.

262. Antitrust (1)
Lecture/discussion—10 hours. Prerequisite: course 201, law school education or the equivalent. Historical and institutional background of antitrust law in the United States. The statutory framework including price fixing, limits on distribution, monopolization and mergers, and reporting requirements. Offered in alternate years.

270. Financing International Transactions (3)
Lecture/discussion—20 hours. Prerequisite: course 201 and law school education or the equivalent. How capital is raised in international markets. Investment strategies for U.S. markets. Taxation of financial investments, international currency regulation, and assessing rates of return on international investments. Offered every three years.

274. Intellectual Property (2)
Lecture/discussion—20 hours. Prerequisite: course 201, law school education or the equivalent. An intensive study of intellectual property law. Areas covered include copyright, trademark and patent law and unfair competition. Offered in alternate years.

285. Environmental Law (2)
Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Introduction to federal and state environmental law. Historical development of environmental law; the role of courts, the legislature and the executive branch in the development and implementation of environmental policy. Review of major statutes. Offered irregularly.—IV.

290. American Legal System Research Seminar (1)
Seminar—5 hours. Prerequisite: course 201, law school education or equivalent. The American legal system and its structure. Legal research methodologies and presentation with attention to analysis, synthesis, organization, and editing techniques common to legal writing. (S/U grading only.)

291C. International Commercial Law Seminar (4)
Seminar—20 hours. Prerequisite: course 201, law school education or the equivalent. Advanced seminar on a current topic in International Commercial Law. Offered at the University of Cologne in Cologne, Germany for two weeks each summer. The topic will change each year.

292. International Commercial Law Seminar (4)
Lecture/discussion—20 hours. Prerequisite: Law school education or the equivalent. Advanced seminar in a current topic in International Commercial Law. The topic will change each year the course is offered. Offered irregularly. May be repeated one time for credit.—IV.

299. Advanced Research in Legal Problems (1-4)
Prerequisite: course 201, law school education or the equivalent. Student individualized research projects under faculty supervision. (S/U grading only.)

International Nutrition

Kathryn G. Dewey, Ph.D., Program Director

Program Office. 3253 Meyer Hall
(530) 752-1992;
http://picn.ucdavis.edu/

Faculty

Monique Borgerhoff-Mulder, Ph.D., Professor *(Anthropology)*
Kenneth H. Brown, M.D., Professor *(Nutrition)*
Caroline Chantry, M.D., Associate Professor *(Pediatrics)*
Kathryn G. Dewey, Ph.D., Professor *(Nutrition)*
Lia C. H. Fernald, Ph.D., Associate Professor *(Public Health Nutrition, Community Health & Human Development, UC Berkeley)*
Lovell S. Jarvis, Ph.D., Professor *(Agricultural and Resource Economics)*
Bo L. Lönnerdal, Ph.D., Professor *(Nutrition)*
Joshua W. Miller, Ph.D., Associate Professor *(Pathology)*
Christine P. Stewart, Ph.D., Assistant Professor *(Nutrition)*

Emeriti Faculty

Lindsay H. Allen, Ph.D., Professor Emeritus
Louis E. Grivetti, Ph.D., Professor Emeritus
Charles H. Halsted, M.D., Professor Emeritus
Janet King, Ph.D., Professor Emeritus
Ernesto Pollitt, Ph.D., Professor Emeritus
Fernando E. Viteri, M.D., Ph.D., Professor Emeritus

Affiliated Faculty

Marjorie Haskell, Ph.D., Associate Researcher *(Nutrition)*
Lucia Kaiser, Ph.D., Specialist in Cooperative Extension *(Nutrition)*
Charles B. Stephensen, Ph.D., Adjunct Professor *(Nutrition)*
Marta Van Loan, Ph.D., Associate Adjunct Professor *(Nutrition)*
Steven A. Vosti, Ph.D., Associate Adjunct Professor *(Agricultural and Resource Economics)*

Graduate Study. The Program in International and Community Nutrition, an organized research unit located in the Department of Nutrition, coordinates specialized course work and research leading to the designated emphasis in International and Community Nutrition for students in various graduate programs. The program focuses on both theoretical and practical issues concerning the identification, treatment, and prevention of human nutritional problems in low-income countries and in disadvantaged ethnic minority groups in the United States. Students enrolled in the designated emphasis are expected to *(1)* complete the course requirements already established by their respective graduate programs, *(2)* participate in a weekly advanced seminar in international nutrition, *(3)* complete additional core courses in international nutrition (Nutrition 219A, 219B, 258) and selected courses in the related disciplines of epidemiology, statistics, and social and behavioral sciences, and *(4)* conduct their dissertation research on a relevant topic under the supervision of a professor who is a member of the Program in International and Community Nutrition.

Students accepted into the following doctoral programs are automatically eligible to participate in the designated emphasis: Nutrition, Agricultural and Resource Economics, Epidemiology, Anthropology, and Human Development. Students from other programs may also be accepted by special request to the Program Director. Upon graduation, students receive a Ph.D. in their major field, with specific recognition for the designated emphasis in International and Community Nutrition.

Graduate Adviser. Contact the Program office.

International Relations

(College of Letters and Science)

Scott Gartner, Ph.D., Program Director

Program Office. 464 Kerr Hall (530) 754-8098

Committee in Charge

James Adams, Ph.D. *(Political Science)*
Kyle Joyce, Ph.D. *(Political Science)*
Charles E. Lesher, Ph.D. *(Geology)*
Zeev Maoz, Ph.D. *(Political Science)*
Baki Tezcan, Ph.D. *(History, Religious Studies)*
Wing Woo, Ph.D. *(Economics)*

The Major Program

Problems of security, development, ethnic conflict, human rights, health, and the environment are increasingly confronted at a global rather than a national level. With its theoretical models and real-world application, the study of international relations is an exciting and highly relevant interdisciplinary major.

The Program. Graduation with a major in international relations requires completion of introductory courses in political science, economics, statistics, and history. The major also requires fluency in English and a working knowledge (approximately 24 to 30 units of course credits or equivalent fluency) of one other modern language. Students choose one of four tracks that encompass major topical areas in combination with an area studies emphasis:

(1) World Trade and Development;
(2) Peace and Security;
(3) Global Environment, Health, and Natural Resources;
(4) Peoples and Nationalities. *Upper division course work for Tracks I, II and III is composed of twelve courses. Students choosing Track IV, Peoples and Nationalities, are required to study or work abroad for a minimum of one quarter; upper division course work is reduced to nine classes in recognition of the experience gained through education abroad.*

Programs, Internships, and Career Alternatives. One program of special interest to international relations majors is the Education Abroad Program, which provides insights into the life and culture of other countries. At UC Davis, the Internship and Career Center assists students in obtaining legislative, legal, and business internships. In addition, the UC Davis Washington Center arranges internships and runs a full-credit academic program in Washington, D.C. with a full range of opportunities for International Relations majors (see also University of California, Davis Washington Program, on page 513). International relations graduates are prepared for employment in government agencies (such as the Foreign Service), state agencies, international or non-governmental organizations (such as the United Nations), foundations, and companies having interests in international business, trade, or finance. The stringent language requirement of the major program enhances career prospects in jobs which demand knowledge of the language and culture of other countries.

International Relations Abroad. International Relations strongly encourages all students to participate in the UC Education Abroad Program; those who choose to study Track IV, Peoples and Nationalities, must study or work abroad for a minimum of one quarter. A maximum of five courses taken abroad may be applied toward the 12 upper division courses in Tracks I, II, and III of the International Relations major. In Track IV, the four Area Studies courses may be done abroad. Courses are selected with the approval of an adviser for the International Relations program.

Preparatory Requirements. Before declaring a major in International Relations, students must com-

plete the following courses with a combined GPA of at least 2.500 at the University of California or other four-year school (at least 3.000 for similar courses taken at community college). All courses must be taken for a letter grade.

Economics 1A or Anthropology 2 .....4 units
Economics 1B .....4 units
History 4C or 10C .....4 units
International Relations 1 or Political Science 3 .....4 units
Statistics 13 or Sociology 46B .....4 units

A.B. Major Requirements:

UNITS

Preparatory Subject Matter..... 24-54

Economics 1A or Anthropology 2 4
Economics 1B 4
History 4C or 10C 4
International Relations 1 or Political Science 3 4
Statistics 13 or Sociology 46B 4
Political Science 51 4
Note: Preparatory Subject Matter does not cover all potential prerequisite courses for upper division curriculum.

Foreign language 0-30

One of the following series in a single language, or certified fluency at the highest level required below:
Arabic 1, 2, 3, 21, 22, 23 30
Chinese 1, 2, 3, 4, 5, 6 30
or Chinese 1A, 4, 5, 6 30
or Chinese 1CN, 2CN, 3CN 15
or Chinese 1BL, 2BL, 3BL 15
French 1, 2, 3, 21, 22 25
German 1, 2, 3, 20, 21 23
Hebrew 1, 2, 3, 21, 22, 23..... 30
Hindi/Urdu 1, 2, 3, 21, 22, 23 30
Italian 1, 2, 3, 4, 5 21
or Italian 1, 2, 3, 8A, 8B 21
Japanese 1, 2, 3, 4, 5, 6..... 30
or Japanese 1A, 4, 5, 6..... 30
Portuguese 1, 2, 3, 21, 22 25
Russian 1, 2, 3, 4, 5 23
Spanish 1, 2, 3, 21, 22..... 25
or Spanish 31, 32, 33..... 15
Note: The language curricula are subject to change; please check with an adviser for the major. A language not listed above may be substituted only with prior written approval of the International Relations Program Committee.

Depth Subject Matter 36-48

Tracks I, II and II: Twelve upper division courses
Track IV: Nine upper division courses
Choose one track below:

Track I: World Trade and Development

Emphasizes contemporary economic relations of industrialized and developing countries.

For Advanced Industrialized Focus:
Economics 100; 101; 160A-160B, Political Science 123..... 20
Two courses selected from Group A..... 8
One course selected from Group B..... 4
Four courses to fulfill Area Studies Requirement 16
For Developing Countries Focus:
Economics 115A-115B, 162 12
Political Science 123, 124..... 8
One course selected from Group A 4
Two courses selected from Group B 8
Four courses to fulfill Area Studies Requirement 16
Group A courses (Advanced Industrialized Countries):
Agricultural and Resource Economics 138, Anthropology 127, Community and Regional Development 118, 141, Economics 102, 110B, International Relations 104, Political Science 130, 140A, 140B, Sociology 138, 139, 141, 183
Group B courses (Developing Countries):
Anthropology 122A, 122B, 123BN, 126A, 126B, 127, 135, Community and Regional Development 153A, 153B, Economics 110B, International Agricultural Development 103, International Relations 104, Political Science 124, 126, 142A Sociology 138, 141, 145A, 145B

Track II: Peace and Security

Focuses on political and security relationships among states and non-state actors, examining questions of war, peace, alliances, and diplomacy.

Economics 162..... 4
Political Science 123, 130, 132..... 12
Political Science 120 or 121 4
Three additional courses from at least two departments selected from Anthropology 123BN, Comparative Literature 157, Economics 122, History 145, 146A, 146B, Philosophy 118, Political Science 112, 122, 124, 126, 131, 140A, 140B, Sociology 100, 118, 157, Women's Studies 102 12
Four courses to fulfill Area Studies Requirement 16

Track III: Global Environment, Health, and Natural Resources

Familiarizes students with new sources of global interdependence such as biodiversity, natural resource conflicts, population growth, and world health.

Note: Some courses shown below have additional prerequisites.
Economics 162..... 4
Anthropology 101 4
Political Science 123..... 4
Environmental Science and Policy 161 or 162 4
Select two from Agricultural and Resource Economics 147, 175, 176, Anthropology 103, Applied Biological Systems Technology 182, Economics 115A, Environmental Science and Policy 164, International Agricultural Development 170, Nature and Culture 120, Physics 160, Political Science 107, 175, Sociology 160 7-8
Select two from one of the following groups.....9-12
Atmospheric and Marine Environments: Atmospheric Science 116, 149, Environmental and Resource Sciences 121, 131, Geology 116N
Land use and Energy Supply: Anthropology 104N, Community and Regional Development 142, Environmental and Resource Sciences 144, Environmental Science and Policy 167, Geology 130, International Agricultural Development 104, Plant Sciences 101, 144, 150, 160, Political Science 171
Health and Human Populations: Anthropology 102, 131, Environmental Science and Policy 121, Environmental Toxicology 101, Internal Medicine-Infectious Diseases 141, Nutrition 111AV, 111B, 118, Sociology 170; Epidemiology and Preventive Medicine 198 and 199 may be taken with the director's prior approval
Four courses to fulfill Area Studies Requirement 16

Track IV: Peoples and Nationalities

Examines social and cultural foundations of national development and international relations.

Select one course from Anthropology 123AN, Sociology 118, 156, 181..... 4
Select one course from Anthropology 130A, 102 4
Select one course each from three of the following four groups 12
The Mixing of Peoples: Anthropology 123BN, 130BN; Community and Regional Development 176; International Relations 104; Political Science 126
Women: Anthropology 126B; Human Development 103; Sociology 145B; Women's Studies 102, 182
Religion: Anthropology 124; Philosophy 105; Religious Studies 170; Sociology 146
Development and its Impact on Social Cleavages: Anthropology 122B, 126A, 126B; Political Science 124, 142A; Sociology 145A, 145B
Four courses to fulfill Area Studies Requirement.....16
Education/Internship Abroad for a minimum of one quarter

Area Studies Requirement

Four courses: Courses must incorporate at least two of three groups (History, Social Analysis, Culture and Literature); we encourage students to take all four courses from one region, but will accept a minimum of three from one region and one from a different region if course offerings within the region of choice are insufficient. Tracks I, II and III students who choose to take advantage of an Education Abroad experience may fulfill the Area Studies requirement by completing three courses instead of four; all three courses must be from one region.

Africa and the Middle East
History: History 113, 115A, 115B, 115C, 115D, 115F, 193B
Social Analysis: African American and African Studies 107C, 110, 111, 156, Anthropology 140A, 140B, 142, Political Science 135, 136, 146A, 146B, Religious Studies 167, Women's Studies 184
Culture and Literature: African American and African Studies 157, 162, Art History 150, Comparative Literature 147, 166, Dramatic Art 155A, French 124

East and South Asia
History: History 191E, 191F, 194C, 194D, 194E, 195B, 196B
Social Analysis: African American and African Studies 107C, Anthropology 143A, 143B, 147, 148A, 148B, 148C, 149B, Economics 171, Political Science 148A, 148B, 148C, Sociology 147, 188
Culture and Literature: Anthropology 145, Art History 153, 163C, Chinese 101, 104, 105, 110, Dramatic Art 154, East Asian Studies 113, Japanese 103, 104, 106, 131, 132, 133, 135, 136

Latin America
History: History 159, 162, 163B, 164, 165, 166B, 167, 168
Social Analysis: African American and African Studies 107A, 180, Anthropology 144, 146, Chicana/o Studies 130, Native American Studies 120, 133, Political Science 143A, 143B, Sociology 158
Culture and Literature: African American and African Studies 163, Art History 151, Chicana/o Studies 160, Comparative Literature 152, 165, Dramatic Art 155A, Spanish 149, 151N, 153, 154, 155, 156, 157, 158, 170, 172

Russian and East/Central Europe
History: History 138B, 138C, 143
Social Analysis: Political Science 144A, 144B
Culture and Literature: Russian 123, 129, 130

Western Europe
History: History 140, 141, 142A, 144B, 145, 146A, 146B, 147B, 147C, 151D
Social Analysis: African American and African Studies 107C, Political Science 137, 147A, 147B, 147C, 147D, 161
Culture and Literature: Film Studies 121, 176A, 176B, French 107, 108, 120, 121, 133, German 114, 115, 118B, 118C, 118E, 120, 126, 141, 142, 143, 168, 185, Italian 108, 120A, 120B, Spanish

137N, 138N, 139, 140N, 141, 142, 148, 157, 170

Total units for the major 60-102

Major Adviser. Scott Gartner *(Political Science)*

Courses in International Relations (IRE)

Lower Division Courses

1. Global Interdependence (4)
Lecture—3 hours; discussion—1 hour. Development of the concept of global interdependence along its political, economic, demographic, cultural, technological, and environmental dimensions. Focus on the ways societies and states interact. Course provides the foundation for upper division multidisciplinary work in international relations.—II. (II.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

104. The Political Economy of International Migration (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: upper division standing. Analysis of worldwide migration patterns, and social scientific theories of international and transnational migration. Focus in economical, political, and social impact of immigration and potential for international and regional cooperation. (Same course as Sociology 104.)

131. Ocean Politics (4)
Lecture—3 hours; term paper. Prerequisite: course 1 or Political Science 3; Political Science 123 recommended. The political, economic, security and environmental aspects of the world's oceans. Focus on the international dimensions of ocean economic resources, and on the means—both cooperative and conflictual—by which these resources have been, and are likely to be, managed.

190. Topics in International Relations (4)
Lecture/discussion—4 hours. Prerequisite: consent of instructor. Selected topics in international relations. Variable content. May be repeated for credit when topic differs.

192. International Relations Internship (1-12)
Internship—3-36 hours (to be arranged). Prerequisite: upper division standing and consent of instructor. Work experience in international relations, with term paper summarizing the practical experience of the student. (P/NP grading only.)

194HA-194HB. Special Study for Honors Students (4-4)
Seminar—2 hours; term paper. Prerequisite: open only to majors of senior standing who qualify for honors program. Directed reading, research, and writing on topics selected by students and instructor culminating in preparation of a senior honors thesis under direction of a faculty adviser. (Deferred grading only, pending completion of sequence.)—I, II. (I, II.)

198. Directed Group Study (1-5)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

International Science Studies

This interdisciplinary minor in International Science Studies will introduce College of Agricultural and Environmental Sciences students to global issues, which affect their major disciplines in the current world, and also provide an opportunity to gain first hand experience abroad when appropriate. The goal of this minor is to enable our college students to develop greater international competence and to enhance their employability.

The minor assumes that the student will have a major in the sciences, and that classes taken under one of the three tracks in the minor will contribute depth to the existing major or establish depth in a selected additional field of study. Students will be expected to work closely with an academic advisor in developing an intellectually coherent program of the study. A minimum of 18 units of upper division work is required. Only a single course can be counted toward both major and minor and no course can be used to satisfy the requirements of more than one minor.

Minor Program Requirements:

UNITS

International Science Studies 24

Global issue course requirement 7-8
Focusing on broad range of global issues and their impacts on ecological and environmental resources and biodiversity, in addition to international policy and economics. Beyond the courses taken under each track, choose two out of the three courses listed below:
(1) Atmospheric Science 116
(2) Plant Sciences 150
(3) Agricultural and Resource Economics 115B
Select one of the following tracks 16-17

Education Abroad Program courses taught overseas and relevant international internship activities will count towards the minor requirement with advisor's approval. For each track, students can take a maximum of three units from EAP courses, with a valid transcript, and three units from relevant international internship activities. The international internship activities would require a pre-approved study plan with the academic advisor before the maximum of three units can be awarded. Language and culture related courses are encouraged, but not required for the minor.

(1) Ecological, environmental, and energy studies track: Select 16-17 units from Anthropology 103, Agricultural and Resource Economics 147, Atmospheric Science 116, 133, Environmental Science and Management 100, 121, 131, 144, 120, 30, Environmental Science and Policy 100, 116, 151, Evolution and Ecology 147, Soil Science 109, Hydrology 143
(2) Policy and management focus track: Select 16-17 units from Agricultural and Resource Economics 115A/B, Agricultural and Resource Economics 138, International Relations 190, Community and Regional Development 156, 180, International Agricultural Development 160, 162, 170, Environmental Science and Policy 102, 175
(3) Agriculture, food, and fiber systems track: Select 16-17 units from Anthropology 103, 130, Atmospheric Science 133, Community and Regional Development 153A/B, Environmental Science and Management 21, 131, Evolution and Ecology 138, Hydrology 124, Plant Sciences 150, 160, Food Science and Technology 108, 109, Nutrition 119A/B, Textiles and Clothing 174

Minor Advisor. Shu-Hua Chen (*Land, Air and Water Resources)* (530) 752-1822, *shachen@ucdavis.edu*

Internship

See Internship Program, below; and University of California, Davis Washington Program, on page 513.

Internship Program

Subhash H. Risbud, Ph.D., Director

Jeanne B. Shelby, Associate Director and Project Manager

Chris Dito, Project Manager

Marcie Kirk Holland, Project Manager

Janice Morand, Project Manager

The Internship and Career Center
2nd and 3rd Floors, South Hall (530) 752-2855;
Buehler Alumni and Visitors Center (530) 752-2286

Program Areas

Agricultural and Environmental Sciences, Career Recruiting Programs, Engineering and Physical Sciences, Graduate Student and Postdoctoral Career Services, Health and Biological Sciences and Liberal Arts and Business

Internship Experience

The Internship and Career Center facilitates a campus-wide internship program. All internships, both credit and non-credit, can be taken for Transcript Notation with completion of required evaluation reports. The notation briefly describes the nature and location of the internship experience. Questions pertaining to academic credit and Transcript Notation may be directed to The Internship and Career Center.

Course Credit. Internship courses (numbered 92 and 192) are available for credit on a variable-unit and Passed/Not Passed grading basis. A maximum of 12 units of 92 and/or 192 courses may be counted toward the 180-unit minimum needed for graduation. To qualify for the 192 course, students must have acquired 84 units of credit. All credited internships require approval and sponsorship by a faculty member from an appropriate discipline. Arrangements may be made through the department of the sponsoring faculty member and facilitated by The Internship and Career Center Staff.

Italian

(College of Letters and Science)

Julia Simon, Ph.D., Chairperson of the Department

Department Office. 213 Sproul Hall
(530) 752-1219; *http://italian.ucdavis.edu*

Faculty

JoAnn Cannon, Ph.D., Professor
Gustavo Foscarini, M.A., Senior Lecturer
Margherita Heyer-Caput, Ph.D., Professor
Juliana Schiesari, Ph.D., Professor
(Italian, Comparative Literature)

Affiliated Faculty

Antonella Bassi, M.A., Lecturer
Jay Grossi, M.A., Lecturer

The Major Program

The major in Italian provides a solid language background which will enable the student to develop an appreciation for Italian language and culture.

The Program. The Italian program is small and geared to the individual needs of the student. The use of Italian is stressed on all levels and knowledge of the language is required for literature courses that are taught only in Italian. The Italian program

actively participates in the Education Abroad Program, the Quarter Abroad Program, the International Internships Program, and the Summer Sessions International (Rome), all of which offer opportunities for travel and study in Italy.

Career Alternatives. Specific career opportunities for those students who have a background in foreign languages are abundant. In addition to the Foreign Service, jobs are available in business and education, both overseas and in the U.S. For example, those wishing to live (for brief or longer periods of time) and work in Italy have a choice of cities: Milan for business, Rome for international concerns in agriculture and nutrition in the F.A.O., and Florence for retail commerce and the arts, just to name a few. In the U.S., foreign-owned companies or American companies with interests in the foreign market need qualified people who are also fluent in a foreign language.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter..... 0-27

Italian 1, 2, 3, 4, 5, and 9 (or the equivalent) 0-27

Depth Subject Matter 36

Italian 101 and 105..... 8

Upper division courses in literature, taught in the language 28

Must include at least one course from two of the following literary periods:

(a) Early Italian

(b) Renaissance and Baroque

(c) Eighteenth through Twentieth Centuries

Upper division General Education courses in Italian may fulfill this requirement with approval of the major adviser.

A total of 8 units in literature may be replaced by Italian 107 (highly recommended) and/or by courses in related fields such as history, art history, music, comparative literature, English, critical theory, classics, and linguistics.

Note: All upper division courses are to be chosen in consultation with the major adviser.

Total Units for the Major 36-63

Recommended

One year or one quarter of study abroad with the Education Abroad Program or college Latin or a Romance Language.

Major Adviser. J. Cannon

Minor Program Requirements:

UNITS

Italian 20

Italian 101 and 105..... 8

Three upper division courses in literature chosen in consultation with major adviser 12

One course chosen from two of the following three areas:

(a) Early Italian Literature

(b) Renaissance and Baroque

(c) Eighteenth through Twentieth Centuries

(One of the above courses may be replaced by course 107 or by a course of literature in translation offered by the Italian Program).

Honors and Honors Program. The honors program comprises two quarters of study under course 194H (3 units) and course 195H (3 units), which will include a research paper and a comprehensive examination. See also Academic Information, on page 70.

Education Abroad Program. Applicable courses taken on EAP are accepted for credit in the major or the minor programs.

Teaching Credential Subject Representative. See Major Adviser above; see the Teaching Credential/M.A. Program on page 114.

Prerequisite Credit. Credit will not normally be given for a course if it is a prerequisite of a course already successfully completed. Exceptions can be made only by the Program Director.

Short Term Language and Culture Program. The Italian program offers an exciting study abroad program of Italian language and culture at the Mediterranean Center for Arts and Sciences in Syracusa, Sicily. The spring quarter program is directed and taught in part by a faculty member of the Italian program. All students in good standing at UC Davis are eligible to apply. There is no language requirement to participate. Language and culture instruction is offered at all levels, and students are able to earn up to 20 units of credit. The courses may be used for credit towards the Italian major or minor. For information, contact the director of the Italian program or the Education Abroad Center.

Courses in Italian (ITA)

Lower Division Courses

Students offering high school language preparation as a prerequisite must take a placement test.

1. Elementary Italian (5)
Discussion—5 hours; laboratory—1 hour. Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed Italian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)—I, II. (I, II.)

1A. Accelerated Intensive Elementary Italian (15)
Lecture/discussion—15 hours. Special 12-week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Italian grammar and development of all language skills in a cultural context with emphasis on communicative ability. Not open for credit to students who have completed courses 1, 2, or 3.—IV. (IV.) Bassi, Grossi

1S. Elementary Italian (5)
Discussion/laboratory—5 hours. Introduction to Italian grammar and development of all language skills in a cultural context with special emphasis on communication. This course is taught abroad. Not open for credit to students who have completed course 1.—III.

2. Elementary Italian (5)
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in areas of grammar and basic language skills.—II, III. (II, III.)

2S. Elementary Italian (5)
Discussion/laboratory—5 hours. Prerequisite: course 1. Continuation of course 1 in the area of grammar and basic language skills. This course is taught abroad. Not open for credit to students who have completed course 2.—III.

3. Elementary Italian (5)
Lecture/discussion—5 hours. Prerequisite: course 2. Continuation of grammar sequence, and practice of all language skills through cultural texts.—I, II, III. (I, II, III.)

3S. Elementary Italian (5)
Lecture/discussion—5 hours. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts. This course is taught abroad. Not open for credit to students who have completed course 3.—III.

4. Intermediate Italian (4)
Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 3. Review of grammar and syntax through written exercises and short prose works. Intended to develop the linguistic foundations of students who have completed the first year language classes.—I, II, III. (I, II, III.)

4S. Intermediate Italian (3)
Lecture/discussion—3 hours. Prerequisite: course 3 or the equivalent. Review of grammar and syntax through written exercises and readings of short prose works. Intended to develop the linguistic foundations of students who have completed the first year language classes. This course is taught abroad. Not open for credit to students who have completed course 4.—III.

5. Intermediate Italian (4)
Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 4. Review and study of grammar and syntax, readings of short prose works, and written exercises. Intended to prepare students to read, understand, and discuss modern Italian.—I, II, III. (I, II, III.)

5S. Intermediate Italian (3)
Lecture/discussion—3 hours. Prerequisite: course 4. Preparation to read, understand, and discuss texts written in Italian. Transition between course 4 and 10. This course is taught abroad. Not open for credit to students who have completed course 5.—III.

8A. Italian Conversation (3)
Discussion—3 hours. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. May be repeated one time for credit. (P/NP grading only.)—I, III. (I, III.)

8AS. Italian Conversation (3)
Discussion—3 hours. Prerequisite: course 3 or the equivalent. Practice in the speaking of Italian. Course is taught abroad. May be repeated for up to 6 units of credit. Not open for credit to students who have completed course 8. (P/NP grading only.)—III.

8B. Italian Conversation (3)
Discussion—3 hours. Prerequisite: course 8A. Course designed to offer practice in speaking Italian. (P/NP grading only.)—II. (II.)

8BS. Italian Conversation (3)
Discussion—3 hours. Prerequisite: course 8A. Practice in the speaking of Italian. Course is taught abroad. May be repeated for up to 6 units of credit. Not open for credit to students who have completed course 8B. (P/NP grading only.)—III.

9. Reading Italian (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 5. Reading and discussion of modern Italian prose, including selections from creative, scientific and journalistic writings. Introduction to contemporary Italian literature and culture. Strengthening the student's command of the Italian language.—I, II, III. (I, II, III.) Cannon

9S. Reading Italian (3)
Lecture/discussion—3 hours. Prerequisite: course 5. Reading and discussion of modern Italian prose, including selections from creative, scientific and journalistic writings. Introduction to contemporary Italian literature and culture as well as strengthening the student's command of the Italian language. This course is taught abroad. Not open for credit to students who have completed course 9.—III.

50. Studies in Italian Cinema (4)
Lecture—2 hours; discussion—1 hour; term paper. Introduction to Italian cinema through its genres. Focus is on cinema as a reflection of and a comment on modern Italian history. Film will be studied as an artistic medium and as a form of mass communication. GE credit: ArtHum, Wrt.—II. (II.)

90X. Lower Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Italian language or culture (such as Italian culture seen through film, Italian feminism, literature, or politics) through shared readings, discussions, written assignments, or special activities such as film screening or laboratory work.

98. Directed Group Study (1-5)
Primarily intended for lower division students. (P/NP grading only.)

Upper Division Courses

101. Advanced Conversation, Composition, and Grammar (4)
Lecture—3 hours; weekly essays. Prerequisite: course 9 or consent of instructor.—I. (I.) Heyer-Caput, Cannon

101S. Advanced Composition, Conversation and Grammar (4)
Lecture—3 hours; extensive writing. Prerequisite: course 9. Instruction and practice in expository writing in Italian, with emphasis on advanced grammar, organization, and vocabulary building. Course will be taught in Italy. Not open for credit to students who have completed course 101.—III.

104. Italian Translation and Style (4)
Lecture/discussion—3 hours; two research papers; term paper. Prerequisite: course 101 or consent of instructor. Practice in translation from Italian to English and English to Italian, using literary and non-literary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material.—III. (III.) Cannon

104S. Translation and Style (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101 or consent of instructor. Practice in translation from Italian to English and English to Italian, using literary and non-literary texts of different styles. Analysis of linguistic problems and elements of style contained in the translation material. Course will be taught abroad. Not open for credit to students who have completed course 104.—III.

105. Introduction to Italian Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101 or consent of instructor. Introduction to the study of the principal authors, works, and movements of the Medieval, Renaissance, and Early Modern periods in Italy. GE credit: ArtHum.—II. (II.) Schiesari

105S. Introduction to Italian Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101 or consent of instructor. Introduction to the study of the principal authors, works, and movements of the Medieval, Renaissance and Early Modern periods in Italy. This course is taught abroad. Not open for credit to students who have completed course 105. GE credit: ArtHum, Div, Wrt.—III.

107. Survey of Italian Culture and Institutions (4)
Lecture—3 hours; term paper. Assessment of the impact of regional autonomy on Italian cultural life from the Middle Ages to the present. Special emphasis will be placed upon achievements in literature, the arts, philosophy, and socio-political institutions. To be taught in English. GE credit: ArtHum.—III. (III.) Foscarini

107S. Survey of Italian Culture and Institutions (4)
Lecture/discussion—3 hours; term paper. Assessment of the impact of regional autonomy on Italian cultural life from the Middle Ages to the present. Special emphasis on achievements in literature, the arts, philosophy, and socio-political institutions. Taught in English. This course is taught abroad. Not open for credit to students who have completed course 107. GE credit: ArtHum.—III.

108. Contemporary Issues in Italian Culture and Society (4)
Lecture/discussion—3 hours; term paper. Analysis of cultural issues in contemporary Italy: Myth and reality of imagined Italies, Italian identities; immigration and race relations; the media and popular culture. Taught in English. GE credit: ArtHum, Div, Wrt.—I. (I.) Bassi

108S. Contemporary Issues in Italian Culture and Society (4)
Lecture/discussion—3 hours; term paper. Analysis of cultural issues in contemporary Italy; myth and reality of imagined Italies; Italian identities; immigration and race relations; the media and popular culture. Taught in English. This course is taught abroad. Not open for credit to students who have completed course 108. GE credit: ArtHum, Div, Wrt.—III.

112. Medieval and Renaissance Poetry: St. Francis to Petrarch (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Study of the origins of Italian religious and secular poetry of the 13th and 14th centuries. A diversified poetry is illustrated in works of St. Francis, Dante, Cavalcanti, Petrarch, the Sicilian School, the Sweet New Style Poets, and other authors. Offered in alternate years. GE credit: ArtHum.—(I.)

113. Dante Alighieri, Divina Commedia (Inferno, Purgatorio, Paradiso) (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Study of Dante Alighieri's Divina Commedia, and its role in the development of Italian language and literature. Emphasis will be placed on reading the whole poem within the historical context of the Middle Ages. GE credit: ArtHum.—III. (III.)

114. Boccaccio, Decameron, and the Renaissance Novella (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Study of the development of the short story in Italy, as exemplified in Giovanni Boccaccio's Decameron, in his predecessors and Renaissance followers. Offered in alternate years. GE credit: ArtHum.—II.

115A. Studies in the Cinquecento (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Analysis of key texts from the high moment of the Italian Renaissance. The political and aesthetic legacy of humanism will be foregrounded in relation to authors such as Ficino, Ariosto, Machiavelli, Aretino, Castiglione, and Tasso. Offered in alternate years. GE credit: ArtHum.—(III.) Schiesari

115B. Italian Literature of the Renaissance and the Baroque: From Cellini to Marino (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 115A. Continued examination into the loss of an ideal. Emphasis on the conflicts in Michelangelo and Tasso leading to Marino, with an excursus on Galileo's role in the formation of a modern literary standard. GE credit: ArtHum.—III. (III.) Schiesari

115C. Italian Drama from Machiavelli to the Enlightenment (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of comic and tragic forms as critical representations of their societal and historical contexts, i.e. Machiavelli and the logic of power, Baroque dramatists in the service of counter-reformation Italy, Goldoni's comedies and bourgeois social consciousness. Offered in alternate years. GE credit: ArtHum.—I. Schiesari

115D. Early Modern Italian Lyric (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Examination of the poetic tradition influenced by Petrarch. Consideration of the relation between gender and genre in such poets as Petrarch, Bembo, della Casa, Tasso, Marino, Gaspara Stampa, Veronica Franco, Isabella di Morra. Offered in alternate years. GE credit: ArtHum.—I. Schiesari

118. Italian Literature of the Eighteenth Century (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of modern Italian literature. Emphasis on the work of Goldoni, Bettinelli, Baretti, Parini, Alfieri and Vico. GE credit: ArtHum.—I. (I.)

119. Italian Literature of the Nineteenth Century (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Romanticism in Italy, including Manzoni, Verga, and Verismo. GE credit: ArtHum.—II. (II.) Heyer-Caput

120A. Italian Literature of the Twentieth Century: The Novel (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of the novel from Svevo to the present. Emphasis on the work of Svevo, Levi, Moravia, Pavese, and Vittorini. GE credit: ArtHum.—III. (III.) Cannon, Heyer-Caput

120B. Italian Literature of the Twentieth Century: Poetry and Drama (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Italian poetry with emphasis on Hermeticism; the theater of Luigi Pirandello and its role in the development of contemporary Italian drama. GE credit: ArtHum.—I. (I.) Cannon, Heyer-Caput

121. New Italian Cinema (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 1 and upper-division standing, or consent of instructor. Italian cinema of the 21st century in the context of profound cultural and social changes in Italy since World War II. Productions by representative directors such as Amelio, Giordana, Moretti, Muccino are included. Knowledge of Italian not required. Offered in alternate years. (Same course as Film Studies 121.) GE credit: ArtHum, Div, Wrt.—III. Heyer-Caput

131. Autobiography in Italy (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. The development of representations of selfhood with particular attention to generic conditions, the confessional tradition and the problem of women's self-representation. Authors studied may included Petrarch, Tasso, Casanova, Alfieri, Zvevok, Sibilla Aleramo and Primo Levi. Offered in alternate years. GE credit: ArtHum.—III. Heyer-Caput, Schiesari

139B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance (4)
Lecture/discussion—3 hours; term paper. Petrarch and Boccaccio and their relations to the Middle Ages and the Renaissance; the Renaissance, with particular attention to the works of Lorenzo de' Medici, Leonardo da Vinci, Machiavelli, Ariosto, Michelangelo, and Tasso. GE credit: ArtHum.—II. (II.)

140. Italian Literature in English Translation: Dante, Divine Comedy (4)
Lecture/discussion—3 hours; term paper. Prerequisite: any course from the GE Literature Preparation List. Reading of Dante Alighieri's Divine Comedy, through the otherworld realms of Inferno, Purgatory, and Paradise. GE credit: ArtHum, Wrt.—I. (I.)

141. Gender and Interpretation in the Renaissance (4)
Lecture/discussion—3 hours; term paper. Prerequisite: completion of Subject A requirement, at least one course in literature, or consent of instructor. Critical analysis of Renaissance texts with primary focus on issues such as human dignity, education and gender politics; "high" and "low" culture and its relation to literary practices. (Same course as Comparative Literature 138.) GE credit: ArtHum, Div, Wrt.—I. (I.) Schiesari

142. Masterpieces of Modern Italian Narrative (4)
Lecture—1.5 hours; discussion—1.5 hours; term paper. Prerequisite: either English 3, Comparative Literature 2, or History 4C. Analysis of major works of Italian narrative fiction from unification of Italy to present. Students will learn to use representative methods and concepts which guide literary scholarship. Consideration of works within European social and cultural context. Offered in alternate years. GE credit: ArtHum, Wrt.—III. Cannon

145. Special Topics in Italian Literature (4)
Lecture/discussion—4 hours. Prerequisite: course 9 or consent of instructor. Study of special topics and themes in Italian literature, such as comic literature, epic poetry, pre-twentieth century theater, fascism, futurism, women and literature, and the image of America, etc. May be repeated for credit when topic differs. GE credit: Wrt.—I, II, III. (I, II, III.)

145S. Special Topics in Italian Literature (4)
Lecture/discussion—4 hours. Prerequisite: course 9 or consent of instructor. Study of special topics and themes in Italian literature, such as comic literature, epic poetry, pre-twentieth-century theater, fascism, futurism, women and literature, the image of America, etc. This course is taught abroad. May be repeated for credit. Not open for credit to students who have completed course 145. GE credit: ArtHum, Wrt.—III.

150. Studies in Italian Cinema (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: Humanities 10 or consent of instructor. Introduction to Italian cinema through its genres. Focus on cinema as a reflection or a comment on modern Italian history. Film as an artistic medium and as a form of mass communication. GE credit: ArtHum, Div, Wrt.—II. (II.) Cannon

190X. Upper Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite: upper division standing and consent of instructor. Examination of a special topic in Italian language or culture through shared readings, discussions, written assignments or special activities such as film screening or laboratory work. Limited enrollment. May not be repeated for credit.

192. Italian Internship (1-12)
Internship—3-36 hours. Prerequisite: upper division standing and consent of chairperson of Italian Department. Participation in government and business activities to gain work experience and to develop a better knowledge of Italian language and culture. (P/NP grading only.)

194H. Special Study for Honors Students (3)
Independent study—3 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Italian literature, civilization, or language studies. (P/NP grading only.)

195H. Honors Thesis (3)
Independent study—3 hours. Prerequisite: course 194H. Writing of an honors thesis on a topic in Italian literature, civilization, or language studies under the direction of a faculty member. (P/NP grading only.)

197T. Tutoring in Italian (1-4)
Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing and consent of instructor. Tutoring in undergraduate courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

197TC. Community Tutoring in Italian (1-5)
Discussion—1-2 hours; laboratory—2-4 hours. Prerequisite: consent of instructor. Field experience as Italian tutors or teacher's aides. May be repeated for credit for a total of 10 units. (P/NP grading only.)—Foscarini

198. Directed Group Study (1-4)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

297. Individual Study (1-5)
Prerequisite: graduate standing or consent of instructor.

298. Group Study (1-5)
Prerequisite: graduate standing or consent of instructor.

299. Research (1-12)
Prerequisite: graduate standing or consent of instructor. (S/U grading only.)

299D. Dissertation Research (1-12)
Prerequisite: graduate standing or consent of instructor. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Japanese

See East Asian Languages and Cultures, on page 213.

Jewish Studies

(College of Letters and Science)

Diane L. Wolf, Ph.D., Program Director

Program Office. 2216 Social Sciences and Humanities Building
http://jewishstudies.ucdavis.edu

Committee in Charge

David Biale, Ph.D. *(History)*
Ari Y. Kelman, Ph.D. *(American Studies)*
Lisa Materson, Ph.D. *(History)*
Susan Miller, Ph.D. *(History)*
Moulie Vidas, Ph.D. *(Religious Studies)*
Diane Wolf, Ph.D. *(Sociology)*

The Program of Study

The Program in Jewish Studies offers students the opportunity to explore Jewish history, communities, literature, religion, and culture in a comparative perspective and multicultural framework. Courses include Hebrew language instruction as well as the study of classical and modern Jewish texts in translation.

The interdisciplinary minor in Jewish Studies provides an introduction to the study of Jewish culture, thought, history, and literature. Students learn a broad range of methodologies and critical concepts in these areas and gain insight into the relation between Jewish identities, histories, and representations and those of the cultures in which Jews throughout the world have lived.

The Program in Jewish Studies will be of special interest to students in History, Religious Studies, Comparative Literature and Sociology as well as other fields in the Humanities and Social Sciences.

Minor Program Requirements:

UNITS

Jewish Studies 20

One course from Jewish Studies 10 or Religious Studies 23 4
4 upper division courses selected from the following list, with at least one course in each category 16
(a) Religion: English 171A; Religious Studies 122, 124, 125
(b) Representations, Languages, and Identity: Comparative Literature 147; English 179; French 108; German 141; Hebrew 100A, 100B, 100C; Jewish Studies 101, 110, 111, 112, 120, 121; Russian 159; Sociology, 174
(c) Histories: History 112A, 112B, 113, 142A, 142B

Advising. Jewish Studies Program office (530) 752-1640 or 754-7007

Courses in Jewish Studies (JST)

Lower Division Course

10. Introduction to Jewish Cultures (4)
Lecture—3 hours; term paper. Diverse Jewish cultures created over the past 2,000 years using examples from less-familiar communities such as India, China, and Ethiopia. Topics include the tensions between homeland/diaspora and questions of identity (race, nationality, culture, or religion). GE credit: SocSci, Div, Wrt.

Upper Division Courses

101. Topics in Jewish Thought (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 10 or Religious Studies 23 or consent of instructor. Selected themes in Jewish thought in historical and social perspective. This course traces the historical development of topics in Jewish thought such as Messianism, or focuses on one specific historical period, such as modern Jewish thought. May be repeated for credit when topic differs. GE credit: ArtHum, Div, Wrt.—II. (II.)

110. Selected Topics in Jewish Literature (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: one lower division literature or Jewish Studies course or consent of instructor. Literature written about the Jewish experience, treated in its historical and social context. Examines literature written in one language, such as English, Hebrew, or Yiddish, or a theme, such as gender or modern identities, as expressed in different literary traditions. May be repeated for credit when topic differs. GE credit: ArtHum, Div, Wrt.—II. (II.)

111. Israeli Writing Since 1960 (4)
Lecture/laboratory—3 hours; extensive writing. Prerequisite: one course in American or European literature. Contemporary Hebrew literature, in translation, in relation to post-independence debates about religious, social, and political identity of the Jewish state; literary reflections of Israeli ethnic diversity and changing gender relations; modern Hebrew poetry and postmodern experiments in fiction. Not open for credit to students who have completed Humanities 119. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—II.

112. Readings in Jewish Writing and Thought in German Culture (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Religious Studies 23 or consent of instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German speaking world; what it means to be "other" in the mainstream culture. May be repeated for credit twice when topic differs. Not open for credit to students who have completed Humanities 121. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—I.

116. Readings in Jewish Writing and Thought in German Culture (4)
Lecture—3 hours; term paper. Prerequisite: Religious Studies 23 or consent of instructor. Historical tradition of Jewish thought in the German cultural context; unique contributions of Jewish writers to culture of the German-speaking world; what it means to be "other" in the mainstream culture. No credit will be given to those students who have completed Humanities 121. May be repeated two times for credit if topic differs. Offered in alternate years. (Same course as German 116.) GE credit: ArtHum, Div, Wrt.—(I.)

120. Cinema and the American Jewish Experience (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 10 recommended. Examination of American cinema to reveal how Jewish identity is expressed and submerged, tracing the relations between religion, identity, race, politics, and art. Not open for credit to students who have completed Humanities 122. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—I.

121. Oral History and Jewish Life (4)
Lecture/discussion—3 hours; term paper. Oral history methodologies and application to an in-depth oral history interview about Jewish life. Topics include oral history practices and ethics, immigration, migration, religious practice, ethnic relations, and community organization structures. Not open for credit to students who have completed Humanities 123. GE credit: SocSci, Wrt.—III.

Land, Air and Water Resources

(College of Agricultural and Environmental Sciences)

Randy Dahlgren, Vice Chairperson

Department Office. 1110 Plant and Environmental Sciences Building (530) 752-1130; http://lawr.ucdavis.edu

Faculty—Soils and Biogeochemistry

Office. 1110 Plant and Environmental Sciences Building (530) 752-1130

Randy Dahlgren, Ph.D., Professor *(Soil Biogeochemistry) Academic Senate Distinguished Teaching Award*
William R. Horwath, Ph.D. Professor *(Soil Biogeochemistry)*
Benjamin Z. Houlton, Ph.D. Assistant Professor *(Biogeochemistry)*
Louise Jackson, Ph.D. Professor and Specialist in Cooperative Extension *(Soil Science)*
Alexandra Navrotsky, Ph.D., Professor *(Chemical Engineering and Materials Science)*
Sanjai Parikh, Ph.D., Assistant Professor *(Soils and Biogeochemistry)*
James H. Richards, Ph.D., Professor *(Plant Nutrition)*
Kate M. Scow, Ph.D., Professor *(Soil Science)*
Wendy K. Silk, Ph.D., Professor *(Hydrologic Science)*
Randal J. Southard, Ph.D., Professor *(Soil Genesis/Morphology)*

Emeriti Faculty

Conrad J. Bahre, Ph.D., Professor Emeritus
Caroline S. Bledsoe, Ph.D., Professor Emeritus
Richard G. Burau, Ph.D., Professor Emeritus
Emanuel Epstein, Ph.D., Professor Emeritus
Robert G. Flocchini, Ph.D., Professor Emeritus
André E. Läuchli, Ph.D., Professor Emeritus
Roland D. Meyer, Ph.D., Specialist in Cooperative Extension Emeritus
H. Michael Reisenauer, Ph.D., Professor Emeritus
Dennis E. Rolston, Ph.D., Professor Emeritus
Michael J. Singer, Ph.D., Professor Emeritus
Harry O. Walker, Ed.D., Senior Lecturer Emeritus
Robert J. Zasoski, Ph.D., Professor Emeritus

Affiliated Faculty

A. Toby O'Geen, Ph.D. Assistant Specialist in Cooperative Extension
G. Stuart Pettygrove, Ph.D., Specialist in Cooperative Extension

Faculty—Atmospheric Science

Office. 1110 Plant and Environmental Sciences Building (530) 752-1130

Cort Anastasio, Ph.D., Professor *(Tropospheric Chemistry)*
Shu-hua Chen, Ph.D., Associate Professor *(Regional Scale Meteorologist)*
Ian Faloona, Ph.D., Assistant Professor *(Atmospheric Science)*
Richard D. Grotjahn, Ph.D., Professor *(Atmospheric Science)*
Terrence R. Nathan, Ph.D., Professor *(Atmospheric Science)*
Kyaw Tha Paw U, Ph.D., Professor *(Atmospheric Science)*
Ruth Reck, Ph.D., Professor *(Atmospheric Science)*
Bryan C. Weare, Ph.D., Professor *(Atmospheric Science)*

Emeriti Faculty

Thomas A. Cahill, Ph.D., Professor Emeritus
John J. Carroll, III, Ph.D., Professor Emeritus
Roger H. Shaw, Ph.D., Professor Emeritus
Marilyn L. Shelton, Ph.D., Professor Emeritus
Su-Tzai Soong, Ph.D., Professor Emeritus

Affiliated Faculty

Richard L. Snyder, Ph.D., Lecturer *(Atmospheric Science)* and Specialist in Cooperative Extension

Faculty—Hydrology

Office. 1110 Plant and Environmental Sciences (530) 752-1130

Graham E. Fogg, Ph.D., Professor *(Hydrogeology)*
Mark E. Grismer, Ph.D., Professor *(Hydrologic Science, Biological and Agricultural Engineering)*
Peter J. Hernes, Ph.D., Associate Professor *(Hydrologic Science)*
Jan W. Hopmans, Ph.D., Professor *(Vadose Zone Hydrology)*
Gregory B. Pasternack, Ph.D., Associate Professor *(Watershed Hydrology)*
Carlos E. Puente, Ph.D., Professor *(Hydrology)*
Susan Ustin, Ph.D., Professor *(Environmental and Resource Sciences)*
Wesley W. Wallender, Ph.D., Professor *(Hydrologic Science, Biological and Agricultural Engineering)*

Emeriti Faculty

James W. Biggar, Ph.D., Professor Emeritus
Robert H. Burgy, M.S., Professor Emeritus
David A. Goldhamer, Ph.D., Lecturer Emeritus
Donald W. Grimes, Ph.D., Lecturer Emeritus
Delbert W. Henderson, Ph.D., Professor Emeritus
Theodore C. Hsiao, Ph.D., Professor Emeritus
Allen W. Knight, Ph.D., Professor Emeritus
Miguel A. Mariño, Ph.D., Professor Emeritus
Donald R. Nielsen, Ph.D., Professor Emeritus
William O. Pruitt, Jr., Ph.D., Lecturer Emeritus
Frank E. Robinson, Ph.D., Lecturer Emeritus
Verne H. Scott, Ph.D., Professor Emeritus

Affiliated Faculty

Stephen Grattan, Ph.D., Lecturer *(Hydrologic Science)* and Specialist in Cooperative Extension
Blaine R. Hanson, Ph.D., Lecturer *(Hydrologic Science)* and Specialist in Cooperative Extension
Thomas Harter, Ph.D., Specialist in Cooperative Extension
Doug Mackay, Ph.D. Adjunct Professor *(Hydrologic Science)*
Terry L. Prichard, M.S., Lecturer *(Hydrologic Science)* and Specialist in Cooperative Extension
Lawrence J. Schwankl, Ph.D., Lecturer *(Hydrologic Science)* and Specialist in Cooperative Extension
Minghua Zhang, Ph.D., Adjunct Professor *(Hydrologic Science)*

Land, Air and Water Resources is a multidisciplinary department with faculty who specialize in atmospheric, plant, environmental resource, soil, hydrology, and water engineering. Teaching and research focus on both agricultural forestry, natural ecosystems, climate change and environmental science. The faculty contribute to numerous other undergraduate and graduate programs in the Colleges of Letters and Science, Engineering, and Agricultural and Environmental Sciences.

Major Programs. Undergraduates in the department major in Atmospheric Science, Environmental and Resources Sciences, Environmental Science and Management, and Hydrology, and Soil and Water Science; see http://lawr.ucdavis.edu/academic_programs.htm.

Undergraduate Advising Center is located in 1150 Plant and Environmental Sciences Building (530) 752-1603.

Graduate Study. Graduate work is offered in the area of Atmospheric Science, Hydrologic Sciences, and Soils and Biogeochemistry. For detailed information, call (530) 752-1669 or see http://lawr.ucdavis.edu/academic_programs.htm.

Courses. See courses listed under Atmospheric Science, Hydrologic Sciences, Hydrology, Environmental and Resource Sciences, Environmental Science and Management, and Soil Science. See also the websites listed above.

Landscape Architecture

(College of Agricultural and Environmental Sciences)

Edward S. McNiel, M.L.A., Chairperson, Landscape Architecture Program

Department Office. 131 Hunt Hall (530) 752-3907; http://lda.ucdavis.edu

Faculty

Mark Francis, M.L.A., Professor
Steven E. Greco, Ph.D., Associate Professor
Eric Larsen, Ph.D., Assistant Research Scientist
Jeff Loux, Ph.D., Assistant Adjunct Professor
E. Byron McCulley, B.S.L.A., Continuing Lecturer
Edward S. McNiel, M.L.A., Senior Lecturer, SOE
N. Claire Napawan, M.L.A., Assistant Professor
Lorence Oki, Ph.D., Associate Specialist in Cooperative Extension
Patsy Eubanks Owens, M.L.A., Associate Professor
Michael Rios, Ph.D., Associate Professor
Heath Massey Schenker, M.A., Professor
Stephen Wheeler, Ph.D., Associate Professor

Emeriti Faculty

Nigel J.R. Allan, Ph.D., Professor Emeritus
Dean MacCannell, Ph.D., Professor Emeritus
Robert L. Thayer, Jr., M.A., Professor Emeritus

The Major Program

Landscape architecture is the planning and design of land areas where human use requires adaptation or conservation of the environment. Students who study landscape architecture are concerned about the welfare of the environment and the people who use it. They are capable of solving physical problems and are able to visualize and "think" in terms of spaces and three-dimensional concepts. The program is fully accredited by the American Society of Landscape Architects, which is the only organization professionally sanctioned to grant landscape architectural accreditations in the United States. The program was last reviewed in 2006.

The Program. The curriculum balances creativity and visual and spatial skills with technological expertise and a thorough background in physical, natural, and social sciences. Students develop proficiency at problem solving relating to design of parks, urban open spaces, energy-efficient neighborhoods, land reclamation projects, city and regional planning, and landscape planning for wilderness and scenic regions, coastal and riparian environments, and other sensitive land areas. The program stresses a process-oriented approach to design and emphasizes environmental and community values.

Preparatory Requirements. Students are admitted to the landscape architecture major only after submitting a portfolio for review and selection by the faculty. Contact the Landscape Architecture Advising Office for further information in 135 Hunt Hall (530) 754-8628.

Career Alternatives. Graduates may find jobs in private landscape architectural firms or public agencies and corporations employing landscape architects. The landscape architecture major provides the student with excellent preparation for graduate school or career development in a wide range of environmental and design-related fields.

B.S. Major Requirements:

	UNITS
Preparatory Subject Matter	**63-74**
Communication 1	4
Biological Sciences 1A, 2A, 1C, 10 or Plant Sciences 2	4-5
Environmental Horticulture 6	4
One course from Mathematics 16A; Statistics 13; Computer Science 10	3-4
One course from Chemistry 2A, 10; Physics 1A, 10; Geology 1; Geography 1; or Soil Science 10	3-5

One course from Landscape Architecture 2 or 3, Geography 2, or 10..... 3-4
Two courses from Anthropology 2, 3, 20, Economics 1A, 1B, Psychology 1, Political Science 1, 2, 3, 4, 5, 7, Sociology 1, 2, 3, 4, 5, or 25..... 8-10
Two courses from Art Studio 2, 5, 7, 8, 16, any course from History, Music, Dramatic Art, Philosophy, Art History, language, or cultural studiesliterature..... 8-10
Landscape Architecture 1, 21, 23, 30, 50, 60, 61, 70..... 32

Depth Subject Matter 44-47

Landscape Architecture 160, 161, 170, 193A, 193B..... 20
Four studios from Landscape Architecture 180/181 or 191..... 17-20
Landscape Architecture 120 or 150..... 4
Landscape Architecture 190 (three quarters) 3
Internship (Landscape Architecture 192) recommended.

Restricted Electives..... 32

Psychology 155..... 4
Two courses from Environmental Horticulture 105, 133; Plant Biology 147; Plant Biology 102; Wildlife Fish, and Conservation Biology 156. (One course must be Environmental Horticulture 105 or Plant Biology 102.) 8
Select 20 units of upper division courses in consultation with adviser 20

Total Units for the Major 153

Major Adviser. Stephen Wheeler

Advising Center is located in 135 Hunt Hall (530) 754-8628.

Graduate Study. Graduate-level landscape architecture courses are available to students pursuing graduate programs compatible with or directed toward landscape management, planning, and design issues. Department faculty are active members of various graduate groups: Community Development, Geography, Transportation Technology and Policy and Ecology. Faculty members have expertise in many areas, including landscape history, social theory, practice of public space design, historic landscape preservation, city and regional planning, community participation in urban landscape design, landscape ecology, resource management, bioregionalism, and regenerative landscape systems. Graduate students pursue more focused interests, expanding their professional expertise and/or conducting advanced research in landscape architecture or related disciplines.

Courses in Landscape Architecture (LDA)

Lower Division Courses

1. Landscape Meaning (4)
Lecture-3 hours; discussion-1 hour. Overview of the meaning of landscapes as manifested in designed and natural landscapes, everyday and sacred environments, parks, plazas, community gardens and found spaces. Introduction to the profession of landscape architecture and methods used to design, plan and manage landscapes. Not open for credit to students who have taken course 40. GE credit: ArtHum or SocSci, Wrt.—I. (I.) McNiel, Napawan

2. Place, Culture and Community (4)
Lecture—4 hours. Introduction to the relationship of social and spatial arrangements. Basic social-science concepts such as class, status, role, kinship, ritual, myth, alienation, etc., introduced through site-specific case studies of both historical and contemporary communities. GE credit: SocSci, Wrt.—II. Owens

3. Sustainable Development: Theory and Practice (4)
Lecture—2 hours; discussion—2 hour. Origins, theoretical perspectives, and practical applications of the concept of sustainable development at a number of scales (site, building, neighborhood, city, region, and nation) through lectures, sketch exercises, student projects, walking tours. GE credit: SocSci, Wrt.—III. (III.) Wheeler

21. Landscape Drafting and Visualization (4)
Studio—8 hours; two all-day field trips. Prerequisite: course in free-hand drawing recommended. Development of idea expression through graphic media and the use of drawing techniques for visual representation, including plan, section, and axonometric drawing. Includes an introduction to computerized drafting and drawing.—I. (I.) Massey Schenker, Napawan

23. Computer Graphics for Landscape Architecture (4)
Studio—8 hours; two all-day field trips. Prerequisite: course 21. Landscape architectural communications explored through the computer. Includes computerized drafting, drawing, rendering, desktop publishing, and photorealistic simulation.—II, III. (II, III.)

30. History of Landscape Architecture (4)
Lecture—3 hours; discussion—1 hour. Introduction to the history of landscape architecture, emphasizing landscape design as a product of cultural, political, social, and environmental factors. Topics include the history of gardens, parks, community design and environmental planning. Not open for credit to students who have taken course 140. GE credit: ArtHum, Wrt.—II. (II.) Massey Schenker

50. Site Ecology (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 2A or 10 or an introductory course in biology, botany, or plant science; priority given to Landscape Architecture majors. Introduction to ecological concepts, including nutrient dynamics, population regulation, community structure, ecosystem function. Principles will be applied to human activities such as biological conservation, ecological restoration, landscape planning, and management. Weekly laboratory devoted to field exercises in local ecosystems. GE credit: SciEng.—III. (III.) Greco

60. Technology I: Grading and Drainage (4)
Studio—8 hours. Prerequisite: courses 21 and 23 or consent of instructor. Priority given to Landscape Architecture majors. Topographic and grading problems in landscape engineering: drainage plans, grading plans, spot elevations, road alignment, sections and profiles and cut and fill calculations. Not open for credit to students who have taken course 132.—III. (III.) McCulley

61. AutoCAD for Landscape Architects (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: Agricultural Management and Range Resources 21 or equivalent with consent of instructor. Priority given to Landscape Architecture majors. Introduction of computer-aided drafting (CAD) techniques and their application to landscape design. Drawing set-up, layer control, basic drawing and editing commands, dimensioning and text styles, symbol libraries, and display commands used in the creation of landscape architectural drawings.—II, III. (II, III.)

70. Basic Landscape Design Studio (4)
Studio—8 hours; field trips. Prerequisite: courses 1, 21, 30 or consent of instructor. Priority given to Landscape Architecture majors. Introduction to basic aesthetic, functional, social, and environmental considerations in landscape design. Provides a broad foundation in landscape design methodologies and skills necessary to create environmentally and socially responsible landscape designs. Not open for credit to students who have taken course 11.—II. (II.) Napawan, Owens

98. Directed Group Study in Landscape Architecture (1-5)
Prerequisite: consent of instructor. Directed group study. (P/NP grading only.)

99. Special Study for Undergraduates in Landscape Architecture (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

120. Advanced Computer Applications (4)
Studio—8 hours; two all-day field trips. Prerequisite: course 23; open to majors in Landscape Architecture only. Studio work using computer-aided design, geographic information systems, and other advanced computer programs.—(III.) McNiel

150. Geographic Information Systems for Land Planners (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Agricultural Management and Range Resources 21 or equivalent with consent of instructor. Priority given to Landscape Architecture majors. Basic concepts, principles, and methods of GIS in relation to land planning applications. Data structures, database design, GIS data creation, and spatial analysis techniques are emphasized. Lab topics include: online data sources, aerial photography, cartographic design, and graphic communication. Not open to credit for students who have completed Applied Biological Systems Technology 180 or 185 or course 50 or 185 (in spring 2004 or 2005).—III. (III.) Greco

160. Technology 2: Construction Materials and Detailing (4)
Studio—8 hours. Prerequisite: courses 21, 23, and 60. Priority given to Landscape Architecture majors. Introduction to materials and methods in landscape construction, including properties of common construction materials (stone, concrete and wood), detailing, preparation of cost estimates and specifications, design of drainage systems, fountains and roof decks. Not open for credit to students who have taken course 133.—I. (I.) McCulley

161. Technology 3: Professional Practice and Construction Documents (4)
Studio—8 hours. Prerequisite: courses 21, 23, 60 and 160. Legal and professional aspects of landscape architecture, including the development of construction documents (drawings and specifications), proposal writing, fee calculations, project management, cost estimation, and insurance.—II. (II.) McCulley

168. Mountain Landscapes and Life (3)
Lecture—3 hours. Prerequisite: an introductory course in cultural geography, cultural anthropology or landscape theory. Course provides knowledge of mountain landscapes, explains why different mountain societies exploit and reject resources available, examines myths about mountain landscapes that influence individual and collective behavior of residents and visitors. Examples from Himalayas, Andes, Alps, and Rockies. GE credit: ArtHum or SocSci, Wrt.

170. Field Studio in Landscape Architecture (5)
Lecture—2 hours; workshop—6 hours. Prerequisite: courses 1, 21, 23, 30, 50, 60 and 70 or consent of instructor. Field study and problem solving experience for juniors in the landscape architecture major. Analysis of complex landscape design and planning problems. Two all-day, weekend field trips required.—I. (I.)

180A. Special Topics in Landscape Architecture: Postmodern Landscapes (2)
Lecture—2 hours. Prerequisite: upper division standing. Basic principles of critical theory and postmodern modes of analysis. Application to interpretation and change of designed environment. Offered in alternate years. Not open for credit to students who have taken course 185.

180C. Special Topics in Landscape Architecture: Art of the Environment (2)
Lecture—2 hours. Prerequisite: courses 1 and 30. Priority given to Landscape Architecture and Design majors. Introduction to environmental art. Encouragement of critical thinking about the intersection of art, landscape and environmental issues. Offered in alternate years.—Massey Schenker

180F. Special Topics in Landscape Architecture: Landscape Ecology (2)
Lecture—2 hours. Prerequisite: course 50 or an introductory course in Ecology. Theories, major concepts and research methods of landscape ecology. Spatial structure, function and dynamics of various landscape types. Biological conservation, ecological restoration, and landscape planning, design, and management. Not open for credit to students who have taken Landscape Architecture 183. Offered in alternate years.—(II.) Greco

180G. Special Topics in Landscape Architecture: Landscape and Regional Land Planning (2)
Lecture—2 hours. Prerequisite: upper division standing. Theories, laws, and practices of community planning. Creation of livable and sustainable communities and natural landscapes, Smart growth, new urbanism, neo-traditional town planning, transit-oriented, and sustainable communities. Traditional master planning vs. participatory planning and design approaches. Offered in alternate years.—II. (II.) Loux, Wheeler

180H. Special Topics in Landscape Architecture: The Bioregional Landscape (2)
Lecture—2 hours. Prerequisite: courses 1 and 30. Priority given to Landscape Architecture majors. Emerging concepts of bioregionalism and community-based ecological regional landscape planning. Extensive examples from within the Sacramento Valley Bioregion. Offered in alternate years.

180I. Special Topics in Landscape Architecture: Regenerative Landscape Systems (2)
Lecture—2 hours. Prerequisite: courses 1 and 30. Priority given to Landscape Architecture majors. Theories, basic techniques and applications for various systems by which landscapes regenerate and sustain life (both human and non-human) and culture over time. Offered in alternate years.—(II.) Wheeler, Lou

180J. Special Topics in Landscape Architecture: Community Participation in Design (2)
Lecture—2 hours. Prerequisite: upper division standing. History and role of community participation in landscape design; methods of community involvement, including workshop techniques. Introduction to design processes, including public participation. Offered in alternate years.—Owens

180K. Special Topics in Landscape Architecture: Social Factors in Landscape Architecture (2)
Lecture—2 hours. Prerequisite: Psychology 155 and upper division standing. Concepts in environmental psychology as they relate to landscape architecture. Discussion of needs of various user groups of a land area. Introduction to post occupancy evaluations. Offered in alternate years.—Owens

180L. Special Topics in Landscape Architecture: Public Open Space (2)
Lecture—2 hours. Prerequisite: upper division standing. Intensive study of public open spaces, including parks, plazas, playgrounds, greenways and community gardens. Current issues associated with design and management of the public environment of cities. Offered in alternate years.

180M. Special Topics in Landscape Architecture: Urban and Community Design (2)
Lecture—2 hours. Prerequisite: upper division standing. Theories and methods of community and neighborhood design. Past and contemporary approaches including new urbanism, planned unit development, mixed use, pedestrian and transit-oriented development. Issues of open space and community form. Offered in alternate years.

180N. Special Topics in Landscape Architecture: Planting Design (2)
Lecture—2 hours. Prerequisite: upper division standing and Environmental Horticulture 6. Develop an understanding of the sensory, visual and functional importance of plants in the landscape. Visualization and design of planted landscapes. Development of planting plans. Offered in alternate years. Not open for credit to students who have taken course 156.

180O. Special Topics in Landscape Architecture: Current Issues in Landscape Architecture (2)
Lecture—2 hours. Prerequisite: course 1 and 30. Priority will be given to Landscape Architecture and Design majors. Study of current issues in landscape architecture with emphasis on design and/or design history. Offered in alternate years.

180P. Special Topics in Landscape Architecture: Water in Community Planning and Design (2)
Lecture—2 hours. Prerequisite: course 50 or equivalent with consent of instructor. Upper division standing or above. Priority given to Landscape Architecture majors. Theories, policies, methods, and resources related to the integration of water resources management with urban/community planning and landscape design including water use/demand, quality, treatment, conservation, and storm water/drainage. Offered in alternate years.—Loux

180Q. Special Topics in Landscape Architecture: Historic Preservation (2)
Lecture—2 hours. Prerequisite: upper division standing. Roots and present focus of historic preservation movement; current philosophies and laws governing preservation, restoration, and revitalization as they affect landscape architects. Offered in alternate years.—Massey Schenker, McNiel

181A. Postmodern Landscapes Design and Planning Studio (3)
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180A concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180A. Offered in alternate years.

181C. Art of the Environment Design and Planning Studio (3)
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180C concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180C. Offered in alternate years.—Massey Schenker

181F. Landscape Ecology and Design Planning Studio (3)
Studio—6 hours. Prerequisite: courses 21, 23, 50, 60, and 170, 180F concurrently. Design theory and methods to real-world projects in ecology. Ecological principles and their application in biological conservation, ecological restoration, and landscape planning, design, and management. Field trip required. Offered in alternate years.—(II.) Greco

181G. Special Topics in Landscape Architecture: Landscape and Regional Land Planning Studio (3)
Studio—6 hours. Prerequisite: course 170, course 181G concurrently. Applications of recent models and practices of urban planning and design to create livable and sustainable cities, towns, villages, rural, and natural landscapes. Testing of models by creating plans and designs for new communities, and for urban infill, restoration or redevelopment projects. Field trip required. Offered in alternate years.—Loux, Wheeler

181H. The Bioregional Landscape Design and Planning Studio (3)
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180H concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180H. Offered in alternate years.

181I. Regenerative Landscape Systems Design and Planning Studio (3)
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180I concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180I. Offered in alternate years.

181J. Community Participation in Design: Design and Planning Studio (3)
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180J concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180J. Offered in alternate years.—Owens

181K. Special Topics in Landscape Architecture: Social Factors in Landscape Architecture (3)
Studio—6 hours. Prerequisite: Psychology 155, course 170, 180K concurrently; upper division standing. Application of design theory and methods to real-world projects. Familiarize students with the major concepts in environmental psychology as they relate to landscape architecture; to discuss the needs of various user groups; and post occupancy evaluations. Open to Landscape Architecture majors only. Offered in alternate years.—Owens

181L. Public Open Space Design and Planning Studio (3)
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180L concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180L. Offered in alternate years.

181M. Urban and Community Design: Design and Planning Studio (3)
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180M concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180M. Offered in alternate years.

181N. Planting Design and Planning Studio (3)
Studio—6 hours; one field trip required. Prerequisite: course 170 and Environmental Horticulture 6; course 180N concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180N. Offered in alternate years.

181O. Current Issues Design and Planning Studio (3)
Studio—6 hours; one field trip required. Prerequisite: course 170; course 180O concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to real-world projects associated with course 180O. Offered in alternate years.

181P. Special Topics in Landscape Architecture: Water in Community Planning and Design Studio (3)
Studio—6 hours. Prerequisite: courses 50 and 61 (or equivalent courses with consent of instructor); course 170; course 180 concurrently. Priority given to Landscape Architecture majors. Application of design theory and methods to community and site scale projects associated with course 180P. Offered in alternate years.—II. Loux

190. Proseminar in Landscape Architecture (1)
Seminar—1 hour. Lectures and discussion of critical issues in landscape architecture. May be repeated three times for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

191. Workshop in Landscape Architecture (2-12)
Seminar—1 hour; workshop—3 hours. Prerequisite: courses 1, 70, and 170 or consent of instructor. Priority to Landscape Architecture majors. Faculty initiated workshops featuring advanced studies and applications of original work in landscape architecture. May be repeated for up to 20 units of credit.—I, II, III. (I., II., III.)

192. Internship in Landscape Architecture (1-12)
Internship. Prerequisite: senior standing in Landscape Architecture. Professional field experience in landscape architecture. May be repeated for a total of 12 units. (P/NP grading only.)

193A. Senior Project in Landscape Architecture (3)
Studio—6 hours. Prerequisite: senior standing in Landscape Architecture. Projects will focus on a critical area of landscape architectural design, planning, analysis, communication, or research. Limited enrollment. Required of all Landscape Architecture majors. (P/NP grading only.)—II. (II.)

193B. Senior Project in Landscape Architecture (4)
Studio—8 hours. Prerequisite: course 193A and senior standing in Landscape Architecture. Projects will focus on a critical area of landscape architectural design, planning, analysis, communication, or research. Limited enrollment. Required of all Landscape Architecture majors. (P/NP grading only.)—III. (III.)

197T. Tutoring in Landscape Architecture (1-5)
Tutoring—3-15 hours. Prerequisite: consent of instructor. Tutoring in Landscape Architecture courses. (P/NP grading only.)

198. Directed Group Study in Landscape Architecture (1-5)
Prerequisite: consent of instructor. Directed group study. (P/NP grading only.)

199. Special Study for Advanced Undergraduates in Landscape Architecture (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200. Citizenship, Democracy, & Public Space (4)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Introduction to seminal works in political theory, philosophy, and the social sciences that focus on citizenship and the public sphere; development of critical perspective regarding restructuring of public space in a pluralistic and global culture; discussion of contemporary case studies—III. (III.) Rios

201. Theory and Philosophy of the Designed Environment (4)
Seminar—4 hours. Prerequisite: course 140 or the equivalent; graduate standing or consent of instructor. Examines the major theories of environmental design. Epistemology of design serves as framework to examine modern landscape architecture, architecture, urban design and planning. Normative theories of design are reviewed along with the social and environmental sciences. Offered in alternate years.—II. Rios

202. Methods in Design and Landscape Research (4)
Seminar—4 hours. Prerequisite: Statistics 102 or the equivalent; graduate standing or consent of instructor. Explores many of the research and advanced design and planning methods employed in landscape architecture. Exercises provide the student with a vehicle for designing independent landscape research and creative activities. Lectures provide an historical overview of research methodology. Offered in alternate years.—Owens

204. Case Studies in Landscape Design and Research (4)
Seminar—4 hours; field trip required. Prerequisite: graduate standing in Landscape Architecture, Ecology, Geography or Community Development or consent of instructor. Real-world designed environment situations where creative activity and/or basic research is the primary product. May be repeated for credit for a total of 12 units. Not offered every year.

205. Physical Planning and Design (4)
Lecture—2 hours; discussion—2 hours. Regulation, design, and development of the built landscape, planning and land development processes, zoning and subdivision regulation, site planning, urban design goals and methods, public participation strategies, creatively designing landscapes to meet community and ecological goals. Limited to graduate students. Not offered every year.—I. (I.) Wheeler

210. Advanced Landscape Architecture Studio (4)
Laboratory—8 hours. Prerequisite: course 113 or the equivalent; graduate standing or consent of instructor. Exposes students to real-world, designed-environment situations where creative activity and/or basic research is the primary product. Advanced landscape problems will be utilized at the site, urban or rural scale. Offered in alternate years.

220. Public Space and Culture (3)
Seminar—3 hours. Prerequisite: course 182 or the equivalent; graduate standing or consent of instructor. Explores the public environment of cities including their streets, parks, and squares. Public life and culture of American cities is examined and design responses to this culture evaluated. Typology is used to identify spaces. Offered in alternate years.

230. Landscape and Memory (4)
Seminar—4 hours; term paper. Prerequisite: graduate standing or consent of instructor. Theories of memory from other fields (critical theory, psychoanalysis, history) applied to landscape design, especially heritage and tourist sites. The relationships between place, memorial, and event. Offered in alternate years.

240. Historic, Cultural Landscapes: Concept, Perception, Preservation (4)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Historic cultural landscapes, as defined by the National Register of Historic Places. Identification and analysis of aerial extent, structured makeup, integrity, and historical significance using common and emerging methods and tools. Offered in alternate years.—McNiel

250. Life-Place: Bioregional Theory and Principles (4)
Seminar—3 hours; tutorial—1 hour. Prerequisite: graduate standing or consent of instructor. The emerging concept of bioregionalism as a hypothesis for environmental quality; theoretical structures and practical methods by which individuals and groups identify with naturally-bounded "life-places" or "bioregions" and strive to live respectfully and reciprocally within them. Offered in alternate years.

260. Landscape and Power (4)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. How various representations of landscape have historically worked as agents of cultural power. Course framework is interdisciplinary, including studies of landscape representation in literature, art, photography, cartography, cinema, and landscape architecture.—Massey Schenker

270. Environment and Behavior (4)
Seminar—3 hours; tutorial—1 hour. Prerequisite: graduate standing or consent of instructor; Psychology 144 recommended. Factors that influence human's interaction with their surroundings and the mechanisms used for recognizing and addressing general and specific human needs in community design and development decisions. Offered in alternate years.—Owens

280. Landscape Conservation (3)
Seminar—3 hours. Prerequisite: contact department for prerequisite courses; graduate standing or consent of instructor. Focus is on land planning, design, and management techniques to further the goal of resource preservation. Examines current critical theory in the establishment and management of conservation areas. Offered in alternate years.—II. Greco

290. Graduate Seminar in Landscape Architecture (2)
Seminar—2 hours. Prerequisite: graduate standing and consent of instructor. Seminar on selected topics in landscape architecture research, analysis, planning, design, communication, or education. May be repeated for credit. (S/U grading only.)

297. Practicum in Landscape Architecture (1-10)
Independent study—1-10 hours. Prerequisite: graduate standing and consent of instructor. Opportunity for students to work directly in the field with academics at other institutions or with professionals in an office setting. Gives experience beyond the confines of campus and allows direct interaction with the community. (S/U grading only.)

298. Group Study (1-5)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299. Directed Individual Research for Graduate Students (1-12)
Requires consent of instructor. May be repeated for credit. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Landscape Restoration

(College of Agricultural and Environmental Sciences)

This minor is of particular interest to students majoring in Wildlife, Fish, and Conservation Biology, Environmental Science and Management, Landscape Architecture, Biological Sciences, Evolution and Ecology and Plant Biology. Biological Sciences 1C or Plant Sciences 2 is a prerequisite to some courses in the minor. The minor is sponsored by the Department of Plant Sciences.

Minor Program Requirements:

	UNITS
Landscape Restoration	**19-25**
Select one of Environmental Science and Policy 155, Plant Biology 102, 117, 147, Plant Sciences 144	4-5
Select one of Environmental Horticulture 100, 130, 133, Plant Biology 119, Plant Sciences 176	3-4
Soil Science 10 or 100	3-5
Environmental Horticulture 160 and 160L	4
Select one of Environmental Horticulture 150, Environmental Science and Policy 155L, Landscape Architecture 180F, 180H, 180I, Plant Sciences 130, Wildlife, Fish, and Conservation Biology 155	2-4
Plant Sciences 192	3

Minor Adviser. T.P. Young *(Plant Sciences)*

Advising Center is located in 1224 Plant and Environmental Sciences (530) 752-7738.

Luso-Brazilian Studies

The Department of Spanish sponsors the minor in Luso-Brazilian Studies, which offers students the opportunity to engage with the Portuguese-speaking world as a global space, as well as gain in-depth knowledge of Brazilian literature, culture and society. The minor is structured to facilitate engagement with Latin American, peninsular, and transatlantic topics, while ensuring that students master the essential skills of linguistic competence, and literary and cultural knowledge.

Minor Program Requirements:

UNITS

Luso-Brazilian Studies 23-24

Portuguese 100, 161..... 8
Select one course in each of the following categories:
Spanish 111N, 115N, or 116 3-4
Portuguese 162 or 163..... 4
Select one elective course in each of the following categories:
Portuguese 159, 162, or 163..... 4
History 159, 163A, or 163B..... 4
Note: Consult a departmental adviser if any of these courses are to be taken abroad.
Note: Additional courses may count toward the minor with prior approval by a departmental adviser.

Education Abroad Program Options. We highly recommend that students participate in study abroad in Salvador, Brazil; see *http://eac.ucdavis.edu*. Courses taken abroad may count toward the Luso-Brazilian Studies minor.

Latin

See Classics, on page 191.

Latin American and Hemispheric Studies

(College of Letters and Science)

Charles F. Walker, Ph.D., Program Director

Program Office. Hemispheric Institute on the Americas, 5211 Social Sciences and Humanities Building (530) 752-3046

Committee in Charge

Stephen Boucher, Ph.D., Assistant Professor *(Agricultural and Resource Economics)*
Marisol de la Cadena, Ph.D., Associate Professor *(Anthropology)*
Robert Irwin, Ph.D., Associate Professor *(Spanish)*
Victoria Langland, Ph.D., Assistant Professor *(History)*
Bettina Ng'weno, Ph.D., Assistant Professor *(African American and African Studies)*
Pablo Ortiz, Ph.D., Professor *(Music)*
Charles F. Walker, Ph.D., Professor *(History)*

The minor in Latin American and Hemispheric Studies offers students the opportunity to explore connections throughout the Western Hemisphere from an array of perspectives across multiple academic fields.

The minor is made up of six courses, arranged in three tiers: Basic (one lower division course on the history of Latin America); Core (two introductory upper division courses chosen from a designated list of fields other than History); and Elective (three additional upper division courses from a designated list of courses that focus primarily on Latin American and/or Hemispheric issues). Students are strongly encouraged to develop proficiency in Spanish or Portuguese, either through course work (such as completion of Spanish 24 or 33), or through life experience.

Minor Program Requirements:

UNITS

Latin American and Hemispheric Studies 24

Basic Courses..... 4
One course from History 7A, 7B, 7C
Core Courses 8
One course each from two of the following categories:
(a) Anthropology 144;
(b) Native American Studies 115;
(c) Spanish 150 or 151;
(d) Political Science 143
Elective Courses..... 12
Three courses selected from the following list to achieve a total of 24 units: African and African American Studies 107A, 155, 163, 172, 180; Anthropology 130C, 146; Art History 151; Chicana/o Studies 130, 160; Comparative Literature 151, 152, 165; Film Studies 189; Music 127; Native American Studies 110A, 110B, 110C, 110D, 120, 125, 133, 181A, 181B, 181C, 184; History 160, 162, 163A, 163B, 164, 165, 166A, 166B, 167, 168, 169A, 169B; Spanish 107A, 117, 149, 151, 153, 154, 155, 156, 157, 158, 159, 163, 170, 171, 172, 174, 175, 176, 177; Portuguese 100, 159, 161, 162, 163;Women's Studies 80, 102

Minor Adviser. C.F. Walker in 1279 Social Sciences and Humanities Building (530) 752-3046

Law, School of

Kevin Johnson, J.D., Dean

Vikram D. Amar, J.D., Associate Dean (Academic Affairs)

Jean Korinke, Assistant Dean (Development & Alumni Relations)

Hollis L. Kulwin, J.D., Senior Assistant Dean (Student Affairs)

Sharon Pinkney, r Assistant Dean (Admission & Enrollment)

Adam Talley, Senior Assistant Dean (Administration)

Dean's Office. 1011 Martin Luther King, Jr. Hall (530) 752-0243; *http://www.law.ucdavis.edu*

Faculty

Afra Afsharipour, J.D., Acting Professor
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Keith Aoki, J.D., Professor
Andrea K. Bjorklund, J.D., Professor
Alan E. Brownstein, J.D., Professor
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Floyd F. Feeney, LL.B., Professor
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Lawrence Green, J.D., Lecturer
Robert W. Hillman, J.D., Professor
Bill Ong Hing, J.D., Professor
John Patrick Hunt., J.D., Acting Professor
Lisa Ikemoto, J.D., Professor
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Krystal Callaway Jaime, J.D., Lecturer
Elizabeth E. Joh, J.D., Professor
Margaret Z. Johns, J.D., Senior Lecturer
Kevin R. Johnson, J.D., Professor
Thomas W. Joo, J.D., Professor
Raha Jorjani, J.D., Lecturer
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Leslie A. Kurtz, J.D., Professor
Evelyn A. Lewis, J.D., Professor
Carlton F.W. Larson, J.D., Professor
Peter Lee, J.D., Acting Professor
Evelyn A. Lewis, J.D., Professor
Albert C. Lin, J.D., Professor
Sharon Weeks McCormack, J.D., Acting Professor
Miguel MJndez, J.D., Professor
Millard Murphy, J.D., Lecturer
Amagda PJrez, J.D., Lecturer
Rex R. Perschbacher, J.D., Professor
Lisa R. Pruitt, J.D., Professor
Leticia Saucedo, J.D., Professor
Timothy Schooley, J.D., Lecturer
Rachana Shah, J.D., Lecturer
Donna Shestowsky, M.S., J.D., Ph.D., Professor
Daniel L. Simmons, J.D., Professor
Madhavi Sunder, J.D., Professor
Clayton Tanaka, J.D., Lecturer
Dennis Ventry, J.D., Acting Professor
Carter C. White, J.D., Lecturer

Emeriti Faculty

John D. Ayer, J.D., LL.M., Professor Emeritus
Edward L. Barrett, Jr., J.D., Professor Emeritus
Florian Bartosic, B.C.L., LL.M., Professor Emeritus
Antonio Bernhard, J.D., Professor Emerita
Carol S. Bruch, J.D., Professor Emerita
Joel C. Dobris, LL.B., Professor Emeritus
Harrison C. Dunning, LL.B., Professor Emeritus
Daniel Wm. Fessler, J.D., S.J.D., Professor Emeritus
Arturo Gándara, J.D., Professor Emeritus
Gary S. Goodpaster, J.D., Professor Emeritus
George S. Grossman, LL.B., M.S., L.S., Professor Emeritus
James E. Hogan, LL.B., Professor Emeritus
John B. Oakley, J.D., Professor Emeritus
John W. Poulos, J.D., Professor Emeritus
Edward H. Rabin, LL.B., Professor Emeritus
Cruz Reynoso, LL.B., Professor Emeritus
Mortimer D. Schwartz, J.D., LL.M., Professor Emeritus
James F. Smith, J.D., Senior Lecturer Emeritus
Martha S. West, J.D., Professor Emerita
Bruce A. Wolk, J.D., Professor Emeritus
Richard C.Wydick, LL.B., Professor Emeritus

Courses of Instruction. The following courses for students enrolled in the School of Law are set up for the semester-system basis only. Instruction dates can be found at the end of the School of Law chapter of this catalog. For current schedule of classes, contact the School of Law.

Courses in Law (LAW)

Professional Curriculum

First Year Courses

200. Introduction to Law (1)
Discussion—1 hour. Introduction to basic concepts of the law, the historical roots of common law and equity, the precedent system in its practical operation, the modes of reasoning used by courts and attorneys, and the fundamentals of statutory interpretation. (S/U grading only.)

200A. Introduction to the Law of the United States (2)
Discussion—2 hours. History and fundamental principles of the United State's legal system. Important current legal issues, developments and trends. Required for LL.M. students who have not attended a U.S. law school. Fall semester only. (S/U grading only.)

201. Property (4)
Discussion—4 hours. A study of doctrines and concepts of property law with primary emphasis on real property. Course coverage includes: the estates in land system; the landlord-tenant relationship, conveyancing, and private and public land use control.

202. Contracts (5)
Discussion—5 hours. Examines sorts of promises that are enforced and the nature of protection given promissory obligations in both commercial and non-commercial transactions. Inquiry is made into the means by which traditional doctrine adjusts or fails to adjust to changing social demands.

203. Civil Procedure (5)
Discussion—5 hours. A study of the fundamental and recurrent problems in civil actions including the methods used by federal and state courts to resolve civil disputes.

204. Torts (5)
Discussion—5 hours. Familiarizes students with legal rules, concepts and approaches pertinent to the recovery for personal injuries, property damages and harm done to intangible interests.

205. Constitutional Law I (4)
Discussion—4 hours. The principles, doctrines and controversies regarding the basic structure of and division of powers in American government. Specific topics include judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers among the branches of the federal government.

206. Criminal Law (3)
Discussion—3 hours. Study of the bases and limits of criminal liability. Coverage of the constitutional, statutory, and case law rules which define, limit, and provide defenses to individual liability for the major criminal offenses.

207. Legal Research and Writing I (2)
Discussion/laboratory—2 hours. This fall semester course taught by Wydick Fellowship Program faculty is an integrated legal research and writing skills course. Basic legal research resources and strategies are introduced and practiced.

207A. Legal Research (LLM) (1)
Discussion—1 hour. A description of the evolution and use of sources of law and secondary authority. LL.M. students only.

208. Legal Research and Writing II (2)
Discussion—2 hours. Focuses on persuasive writing and oral advocacy. Students will complete integrated research and writing assignments, including a complaint, a strategic defense office memorandum, a motion to dismiss in federal court, and an appellate brief, with oral arguments by all students.

Second and Third Year Courses

(a) General/Topical Survey Courses: 224, 254A, 257, 277T, 281, 285C, 285D, 294A, 298
(b) Business Law: 215, 215A, 220, 228, 232, 236A, 236B, 242, 243, 247, 253, 255, 266A, 269A, 269C, 271A, 271B, 284, 286D, 291A, 291B
(c) Constitutional Law: 216A, 218, 240, 288, 288A
(d) Criminal Law: 210, 210A, 213, 213A, 227A, 245, 245T, 276, 286D
(e) Estate Planning: 214, 223, 221
(f) Environmental Law: 235, 235A, 256, 264, 264A, 265, 282, 285, 285A, 285B, 285C, 285T, 289A, 409, 450
(g) Family Law: 225, 242, 272, 435
(h) Health Law and Bioetics: 212A, 226, 286, 286, 286A, 286B, 286C, 286D, 286E
(I) Human Rights and Social Justice: 213A, 218, 220T, 222, 222A, 226, 231, 231A, 248B, 251T, 251 TB, 254, 254A, 259, 259P, 259T, 260, 267, 276, 277, 286B, 286D, 287A, 288, 292, 408, 420, 440, 450T, 460
(J) Individual and Group Study: 411A, 41B, 416, 417, 418, 419, 498, 499
(k) Intellectual Property and Technology: 209A 217, 248A, 266A, 274, 274A, 274D, 285C, 286, 295A, 296, 296T, 460
(l) International, Comparative and Foreign Law: 210, 213A, 224, 230, 247A, 248, 248T1, 248B, 242, 252, 270, 274A, 291A, 291B, 292, 293, 440, 450T
(m) Labor and Employment Law: 231A, 248F, 251, 251T, 255, 260, 279, 285C, 285D, 455
(n) Legal Theories and Ethics: 220T, 237, 250, 258, 259, 284, 286C, 286D
(o) Medicine and Mental Health Law: 212, 241, 286, 286A, 286B, 286C
(p) Procedure and Jurisdiction: 242, 246, 257, 275, 281, 283, 297
(q) Public Law and Policy 210T, 235, 235T, 240, 240A, 248, 254, 257, 257A, 279, 281, 285T, 287A, 287T, 293, 408A, 445, 460
(r) Skills and Litigation: 211, 219, 219T, 228, 229, 239, 261, 263A, 271, 275, 278, 280, 297, 401A, 401B, 409, 410A, 410B, 410C, 412, 413, 414, 415, 430, 451, 465
(s) Taxation: 214, 220, 220T, 247, 247B, 255, 271, 271A, 271B
(t) Clinical Programs–Externships: 425, 430, 445, 450, 455, 460, 470
(u) Clinical Programs–In-House Clinicals: 420, 435, 440, 480
(v) Individual and Group Study: 411, 411B, 416, 417, 418, 419, 495, 499

209A. Patent Law (3)
Discussion—3 hours. Prerequisite: course 274 or consent of instructor. This course covers all essential aspects of patent law: patentable subject matter, novelty, utility, nonobviousness, enablement, prosecution, infringement, and remedies.

210. Criminal Justice Administration Seminar (2)
Seminar—2 hours. This course compares U.S. criminal procedure with that of other countries, particularly the differing roles of the prosecutor, defense counsel, and the judge. Limited enrollment.

210A. Privatization of Criminal Justice Seminar (2)
Seminar—2 hours. Prerequisite: Prior social theory or criminal procedure knowledge not required; completion of course 227A strongly recommended. Analyze the legal, historical, and sociological aspects of the growing private sector provision of criminal justice services traditionally assumed by government, including prisons, policing, and adjudication. Limited enrollment.

211. Negotiation (2)
Discussion—2 hours. Theoretical and empirical approaches to negotiation for the purposes of making deals and resolving legal disputes. Limited enrollment.

212A. Medical Liability Law and Policy (2)
Discussion—2 hours. This course will consider the many ways in which society seeks to establish and maintain quality in patient care.

213A. Transnational Criminal Law (3)
Discussion—3 hours. Prerequisite: course 205; course 206. Will examine the laws responses to a particular aspect of globalization, transnational crime. The course will explore the phenomenon of transnationality and how it affects the power of nationstates, acting alone or together, to prosecute certain crimes.

214. Estate and Gift Tax (3)
Discussion—3 hours. Prerequisite: course 220; course 221 recommended. Fundamentals of federal transfer taxation, including the estate tax, the gift tax, and the generation-skipping transfer tax.

215. Business Associations (4)
Discussion—4 hours. Legal rules and concepts applicable to business associations, both public and closely held. Corporate form of organization, partnerships and other associational forms.

215A. The Law of Corporate Governance Seminar (2)
Seminar—2 hours. Prerequisite: course 215. Advanced issues in the governance of publicly held corporations. Separation of ownership and control and how the law has addressed this issue at the theoretical level and in the context of topics such as the duties of corporate directors, shareholder voting rights, and competition among states to attract corporate charters.

215S. Special Session Business Associations (4)
Discussion—4 hours. This course provides a broad survey of the legal rules and concepts applicable to business associations, both public and closely held. Principal attention is given the corporate form of organization, although partnerships are also treated briefly. Topics surveyed include the planning of business transactions, the process of incorporation, the financing of corporations, and role of managements and shareholders, the federal securities laws, and social responsibility.

216A. Law and Religion (2)
Discussion—2 hours. Federal constitutional law relating to religion. Interpretation and application of the Free Exercise Clause and the Establishment Clause of the First Amendment. State constitutional law. Federal and state statutes relating to religion.

217. Telecommunications Law (3)
Discussion—3 hours. Economic and administrative regulation of telephony, radio and television broadcasting, and video technologies such as cable and direct broadcast satellites. Emphasis on the recently enacted Telecommunications Reform Act and the role of the Federal Communications Commission, as well as other sources of regulation such as related antitrust law and state public utility regulation.

218. Constitutional Law II (4)
Discussion—4 hours. This course principally covers the First Amendment and the Equal Protection Clause.

219. Evidence (3)
Discussion—3 hours. Covers rules regarding the admissibility of testimonial and documentary proof during trial of civil and criminal cases, including rules governing relevancy, hearsay, the examination and impeachment of witnesses, expert opinion, and constitutional and statutory privileges.

219T. Advanced Evidence (3)
Discussion—3 hours. Prerequisite: course 219. Limited to six students; selected by professor. Limited to six students; selected by professor. Interested students complete an application form; available in the Law Registrar's Office. Credit is contingent on attending all classes and participating in all exercises. Participation is crucial to the success of the course, as students will be working in teams of three. Do not take this course unless you are willing and able to participate fully and can accept criticism. Public interest lawyers often spend much time in the courtroom. Prosecution, defender, and legal aid offices usually don't have resources to train lawyers in trial work. Course seeks to help remedy this deficiency by helping develop witness interrogation skills. (S/U grading only.)

220A. Federal Income Taxation (3)
Discussion—3 hours. Surveys the federal income tax system, with consideration of the nature of income, when and to whom income is taxable, exclusions from the tax base, deductions and credits, and tax consequences of property ownership and disposition.

220S. Special Session Federal Income Taxation (2)
Discussion—2 hours. Introduction to the basic principles of federal income taxation using the American federal tax model. Topics include identification of income subject to taxation, gains and losses from property transactions, the timing of income and deductions and the identity of people subject to tax on particular items of income.

221. Trusts, Wills and Decedent's Estates (3)
Discussion—3 hours. The law of decedent's estates, wills and trusts. Topics include intestate succession; family protection and limits on the power of testation; execution, revocation and revival of wills; will substitutes; intervivos and testamentary private trusts. Topics may include contracts to make wills; class gifts; powers of appointment; the Rule against Perpetuities; and introduction to the administration of estates and trusts, including powers, duties, rights, and liabilities of fiduciaries and the management of assets.

222. Critical Race Theory Seminar (3)
Discussion—3 hours. Examines race relations and racial discrimination in America through the perspectives of proponents of the Critical Race Theory movement ("CRT"), a collection of legal scholars who challenge both conservative and liberal political orthodoxies.

222A. Latinos and Latinas and the Law (2)
Seminar—2 hours. Seminar analyzes some of the legal issues of particular relevance to the Latino community in the United States, including racial identity, immigration, language regulation, national and transnational identity issues, affirmative action, and civil rights.

223. Estate Planning Seminar (2)
Seminar—2 hours. Prerequisite: course 221. Selected topics in the estates and trusts area. Content varies with instructor. Satisfies the advanced legal writing requirement. Limited enrollment.

224. Animal Law Seminar (2)
Seminar—2 hours. An introduction to legal principles affecting animals and their use.

225. Marital Property (2)
Discussion—2 hours. The California community property system, including the rights of marital and domestic partners during the ongoing relationship, and upon the end of the relationship by death or divorce.

226. Disability Rights (2)
Discussion—2 hours. The Americans with Disabilities Act (A.D.A.) as it applies to employment, higher education, public accommodations, and government services and programs. Emphasis on the statutory definition of disability, entities subject to the A.D.A., the "otherwise qualified" requirement, forms of discrimination, reasonable accommodation, and defenses.

226T. Topics in Disability Rights (2)
Seminar—20 hours. Focuses on the Americans with Disabilities Act (ADA) as it applies to employment, higher education, public accommodations, and government services and programs. (P/NP grading only.)

227A. Criminal Procedure (3)
Discussion—3 hours. Federal constitutional limits on government authority to gather evidence and investigate crime. Topics include Fourth Amendment limits on search, seizure, and arrest; the Fifth Amendment privilege against self-incrimination; and the Sixth Amendment right to counsel.

227B. Advanced Criminal Procedure (3)
Discussion—3 hours. Examines a range of issues, including bail, charging decisions, preliminary hearings, discovery, statute of limitations, venue, joinder and severance, pleas, plea bargaining, assistance of counsel, trial, double jeopardy, sentencing, appeal and collateral remedies.

228. Business Planning and Drafting (3)
Discussion—3 hours. Prerequisite: course 215 or consent of instructor; course 220 or consent of instructor; prerequisites for this class are rarely waived, do not register for the course unless you have satisfied them or received advance approval from the professor waiving them with respect to you. Acquaints students with a range of business transactions frequently encountered by lawyers representing business clients and/or individuals of moderate or large wealth. Limited enrollment.

228A. Mergers and Acquisitions Law (3)
Discussion—2 hours. Prerequisite: course 215. Takes a practical approach to mergers and acquisitions, with an in-depth look at the planning, negotiation and completion of mergers and acquisitions.

229. Scientific Evidence (3)
Discussion—3 hours. Prerequisite: course 219. In addition to examining the evidence law governing the admission of scientific testimony, this course considers trial advocacy in presenting and attacking such testimony. Limited enrollment.

230. International Environmental Law (3)
Discussion—3 hours. Prerequisite: prior course work in environmental law and/or international law helpful. Provides an overview of the structure and basic principles of international environmental law and policy.

231. Sex Based Discrimination (3)
Discussion—3 hours. Issues raised by legal and social distinctions between men and women. Explores potential remedies for discrimination drawn from constitutional law, statutory enactments, and common law developments. Subject matter areas include sex-based discrimination in constitutional law, family law, reproductive rights, educational opportunity, criminal law, and employment.

231A. Sexual Orientation, Gender Identity, and the Law (2)
Discussion—2 hours. Examines the legal and social regulation of sexual orientation and gender identity.

232. Real Estate Finance (2)
Discussion—2 hours. An examination of the problems involved in the acquisition, financing, and development of real estate, and of lender remedies and debtor protections in the event of debtor default. The practical application of California legal doctrines.

235. Administrative Law (3)
Discussion—3 hours. Examines how the U.S. Constitution and the federal Administrative Procedure Act constrain and regulate decision making by government agencies and officials.

235T. Public Regulatory Law (3)
Discussion—3 hours. Provides an introduction to techniques of government regulation, principles of statutory interpretation, and judicial review of administrative agency rulemaking.

236A. Securities Regulation (3)
Discussion—3 hours. Prerequisite: course 215 or consent of instructor.Legal rules and concepts applicable to business associations, both public and closely held. Corporate form of organization, partnerships and other associational forms.

236B. Securities Regulation II (2)
Discussion—2 hours. Prerequisite: course 215 or consent of instructor; course 236A recommended. Securities Exchange Act of 1934 and the regulation of securities markets. Topics covered include regulation of securities markets and securities professionals, responsibilities of securities lawyers, continuous reporting, transnational securities fraud, and enforcement of the securities acts.

237. Legal History (2)
Discussion—2 hours. A survey of Anglo-American legal history from the origins of the common law in medieval England through the twentieth-century. The course will focus on the development of legal institutions, such as courts and juries, as well as on doctrines of substantive law.

239. Mediation: Theory and Practice (3)
Discussion—3 hours. Prerequisite: course 211, 297. The basic, practical knowledge necessary to begin a mediation practice. Detailed understanding of the mediation process to counsel clients knowledgeably about the mediation option and represent clients ably in mediation. Communication skills, development of the ability to analyze disputes to understand why negotiations succeed or fail, and understanding of the advantages and limitations of mediation as a method of resolving disputes. The stages of a mediation: contracting (establishing contact with the parties and explaining the process), developing the issues, working the conflict, resolving the conflict, and closure. Limited enrollment.

240. Elections and Political Campaigns (2)
Discussion—2 hours. Covers selected constitutional and statutory aspects of federal and state elections, including campaign finance, initiatives, and other topical issues. Limited enrollment.

240A. Law of the Political Process (3)
Discussion—3 hours. Covers many of the foundational issues in the "law of democracy," as that body of statutory and constitutional law has developed in the United States.

241T. Voting Rights Act Seminar (2)
Seminar—2 hours. Explores the Voting Rights Act of 1965, its subsequent amendments, and litigation brought under or in reaction to the Act.

242. Conflict of Laws (3)
Discussion—3 hours. A study of how law operates across state and national borders. The topics covered include choice of applicable law in transactions involving multiple jurisdictions, recognition of judgments, and the exercise of jurisdiction.

242S. Special Session Conflict of Laws (2)
Discussion—2 hours. Study of transactions with multi-state and international contracts. Topics include jurisdiction, recognition of foreign judgments, and choice of applicable law. Addresses problems that international lawyers encounter in a wide variety of deals with the emphasis on international commercial deals.

243. Commercial and Bankruptcy Law (4)
Discussion—4 hours. The business debtor who doesn't have enough money (or is unwilling) to pay his debts. Remedies available to creditors to force payment, along with devices that creditors may use to give themselves priority against limited assets. Examination of the role of bankruptcy. Bankruptcy both as a means for providing funds for creditors, and as a device for maximizing asset value.

245. Corporate and White Collar Crime (3)
Discussion—3 hours. The law of conspiracy, corporate criminal liability, mail and wire fraud, RICO, money laundering, and other business and environmental crimes and associated defenses.

245B. Death Penalty Seminar (2)
Seminar—2 hours. Offers overview of the constitutional law governing the death penalty in the United States. Limited enrollment.

246. Federal Jurisdiction (3)
Discussion—3 hours. Prerequisite: course 205. A study of subject-matter jurisdiction of federal courts.

247. Taxation of Partnerships and LLCs (3)
Discussion—3 hours. Prerequisite: course 220. The federal income taxation of business entities whose owners are taxed on the income, deductions and losses of the entity on a pass-through basis.

247A. International Aspects of U.S. Taxation (3)
Discussion—3 hours. Prerequisite: course 220. Completion or current enrollment in a course covering the domestic taxation of corporations is suggested but not required. Corporate Tax may be taken concurrently. Examine the U.S. income tax laws and policies related to the taxation of foreign income of U.S. persons and U.S. income of foreign person.

247B. Corporate Tax (2)
Discussion/laboratory—2 hours. Examination of the federal income tax relationship between corporations and their owners. Covers the transfer of funds into a corporation on formation and the re-transfer of money and property from the corporation to its shareholders.

248. Public International Law (3)
Discussion—3 hours. Introductory course covers basic international law concepts and the law-making process.

248A. Jurisdiction in Cyberspace Seminar (2)
Seminar—2 hours. Review concepts in international law, conflicts of law, cyberlaw, and federal jurisdiction to address the growing multi-jurisdictional conflicts created by the Internet. Examine European efforts at crafting intra-Europe jurisdictional rules, as well as other international jurisdiction treaty projects such as those at the Hague. Limited enrollment. GE Credit: Wrt.

248B. International Human Rights & Transitional Justice (3)
Discussion—3 hours. Study in international law respecting the protection of individuals from harm, both by the state and, increasingly, by other individuals.

248T. Is International Law Democratic? (2)
Seminar—2 hours. We will examine the international law-making legal process, theories of democracy, and the relationship of international and national tribunals. Limited enrollment.

248TT. Theories of International Law (2)
Discussion—2 hours. International law, once critiqued as powerless and ineffective, is now challenged as a threat to American democracy. Introduction to competing theories of international law, including natural law, positivism, realism, liberalism, constructivism, fairness, legal process, and world public order.

249. Comparative Law (3)
Discussion—3 hours. The uses of comparative method, principal differences between common law and civil law and the styles of legal reasoning that prevail in these two great legal cultures. Topics include the evolution of the civil law, the phenomenon of codification, the structure of European civil codes and the interpretation of their provisions, the respective roles of counsel, judges and law teachers, civil law procedure, and the analysis of selected areas of substantive law. Knowledge of a foreign language is not required.

249S. Special Session Comparative Law (1)
Discussion—1 hour. This course will provide a comparative perspective for students of American law. After an initial look at the uses of the comparative method, discussions will be centered around the main differences between common law and civil law and the different styles of legal thinking. Topics to be covered will be the evolution of the civil law and the idea of codification, the structure of European civil codes and the interpretation of their provisions, the personnel of the law and procedure in civil law countries, and the analysis of selected problems of substantive law. Knowledge of a foreign language will not be required.

250. Jurisprudence Seminar (2)
Seminar—2 hours. Deals principally with the question of how judges should decide "hard cases," where the content of the law is in doubt and competent arguments have or could be offered for mutually inconsistent decisions in favor of either party. Limited enrollment.

250T. Asian American Jurisprudence (3)
Discussion—3 hours. Legal, social, and political discourse on race relations has traditionally been framed in Black-White terms. This course disrupts the traditional view by taking Asian Americans seriously.

251. Labor Law (2)
Discussion—2 hours. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law. Historical development of labor law, the scope of national legislation, union organization and recognition, the legality of strikes, picketing, and the negotiation of collective bargaining agreements.

251T. Labor Law I (2)
Discussion—2 hours. Restricted to students who previously took Labor Law in Fall 2008 may not enroll in Labor Law I. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law.

251TB. Labor Law II (2)
Discussion—2 hours. Prerequisite: course 251T preferred; not required. Survey of the legislative, administrative, and judicial regulation of labor relations under federal law.

252. International Litigation and Arbitration (3)
Discussion—3 hours. Current developments in international law, conflict of laws, civil procedure, arbitration, and comparative law in the context of transactions and disputes that cut across national boundaries.

254. Housing Law (2)
Discussion—2 hours. This survey course covers legal and policy issues related to developing, protecting and preserving affordable, safe and accessible housing and sustaining viable, diverse communities.

254A. Law and Rural Livelihoods Seminar (2)
Seminar—2 hours. Provides broad overview of law as it relates and applies to rural people and places.

254T. Law and Rural Livelihoods Seminar (2)
Seminar—2 hours. Provides a broad overview of law as it relates and applies to rural people and places.

255. Pension and Employee Benefit Law (3)
Discussion—3 hours. Prerequisite: course 220. The federal regulation and taxation of private pensions and employee benefits. The Employee Retirement Income Security Act (ERISA), including such topics as coverage, forfeitures, spousal rights, creditor access, fiduciary duties, preemption of state law, remedies, and other litigation issues. Internal Revenue Code issues such as discrimination in favor of the highly compensated, limitations on contributions and benefits, rollovers, IRAs, early distribution penalties, and minimum distribution rules.

256. Land Use (2)
Discussion—2 hours. Local agencies, developers, environmental interest groups, and others who regularly deal with the administrative and legislative applications of land use planning and development laws. Topics include zoning, general plans, local government land use regulation, and related areas of litigation. The expanding role of the California Environmental Quality Act.

257. Legislative Process (2)
Discussion—2 hours. Fundamental elements of the legislative process, including legislative procedure; the legislature as an institution; lobbying; statutory interpretation, legislative-executive relations; and the legislature's constitutional powers and limitations.

257A. Legislative Intent Seminar (2)
Seminar—2 hours. Theories and principles of statutory and constitutional interpretation. Original intent vs. living constitution; permissible kinds of evidence for determining legislative intent; canons of construction; extent to which initiatives should be interpreted similarly to legislative enactments.

257B. Statutory Interpretation (2)
Seminar—2 hours. This course addresses the process of statutory interpretation, commercial and public interest, and construction of public instruments. The course covers legal and political science theories, and the practicalities of the legislative process, which bear on interpretation of statutes and regulations.

258. Professional Responsibility (2)
Discussion—2 hours. The American Bar Association's Model Rules of Professional Conduct and the Code of Judicial Conduct, which are tested on the Multistate Professional Responsibility Examination, and the California Rules of Professional Conduct, which are tested on the California Bar Examination. Issues affecting the legal profession, including lawyers' ethical duties and responsibilities to clients, the courts, third parties, and the legal system.

259. Feminist Legal Theory (2)
Discussion—2 hours. Provides an overview of feminist legal theory and considers how its various strands inform legislative and judicial law making. Satisfies Advanced Writing Requirement.

259A. Women, Islam and the Law (2)
Seminar—2 hours. This course will study legal and religious reform movements for women's rights within Muslim communities in the context of current scholarly and political debates about fundamentalism, democracy, equality, secularism, universalism, and multiculturalism. This is a limited enrollment seminar.

259P. Women and the Law Practicum (1)
Discussion/lecture. Prerequisite: prior or concurrent enrollment in course 259. Complements the content of the feminist legal theory course by providing students the opportunity to consider how feminist theory may be used to inform law-making.

260. Employment Discrimination (3)
Discussion—3 hours. Examine federal laws prohibiting employment discrimination, including Title VII of the Civil Rights Act of 1964, the Equal Pay Act, the Age Discrimination in Employment Act, the Americans with Disabilities Act, the Rehabilitation Act of 1973, and § 1981.

261. Judicial Process (2)
Discussion—2 hours. Examines a variety of issues concerning the judicial process. Focus is on judge's role in the legal process, the administration of justice, ethical issues, decision making, bias, and critical examination of the strengths and weaknesses in our current judicial system.

262. Antitrust (3)
Discussion—3 hours. Focus of the course is the federal antitrust laws, concentrating on basic substantive areas of the Sherman and Clayton Acts.

262S. Special Session Antitrust (1)
Discussion—1 hour. A study of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization and mergers.

263A. Trial Practice I (3)
Discussion—2 hours; laboratory—1 hour. Prerequisite: course 219, may be taken concurrently. Introduction to the preparation and trial of cases, featuring lectures, videotapes, demonstrations, assigned readings and forensic drills. Laboratory held on Tuesday, Wednesday, and Thursday evening. Limited enrollment.

264. Water Law (2)
Discussion—2 hours. Property rights in surface waters, including riparian rights, prior appropriation, and public rights use of water bodies; environmental constraints on exercise of water rights; groundwater rights and management; federal allocation and control of water resources; legal aspects of interstate allocation.

264A. Ocean and Coastal Law (2)
Discussion—2 hours. An introduction to the goals and challenges of coastal and ocean policy.

265. Natural Resources Law Seminar (2)
Seminar—2 hours. Topic varies each year. This year, we will take a close look at the challenges of managing the Sacramento-San Joaquin Delta, which is both the most important estuary on the west coast and the hub of California's water delivery system. Limited enrollment.

266A. Law of E-Commerce (3)
Discussion—3 hours. Emerging legal issues crucial to the conduct of business in cyberspace. Discussion of the evolution and current administration of the Internet and the World Wide Web.

267. Civil Rights Law (3)
Discussion—4 hours. Civil remedies for civil rights violations under the primary United States civil rights statute. Specifically, covers actions for constitutional and statutory violations under 42 USC §1983, affirmative defenses, and abstention doctrines.

267B. Civil Rights Seminar (2)
Seminar—2 hours. The social, political, legal and historical factors which led to the creation of the United States Commission on Civil Rights (USCCR) in 1957. The United States Commission on Civil Rights is a bipartisan, independent agency established by the Civil Rights Act. It is directed to investigate complaints alleging deprivations of the right to vote, and voter fraud; to study and collect information relating to discrimination and the denial of equal protection of the laws under the Constitution on the basis of race, color, religion, sex, age, disability, or national origin; and submit reports, findings and recommen-

dations to the President and to Congress. The role that the USCCR has played and continues to play in American politics, legislative enactments and the national dialogue on equality, fairness and justice in the context of civil and human rights. Satisfies Advanced Legal Writing Requirement. Limited enrollment.

269A. Basic Finance (3)
Discussion—3 hours. Students with a non-law basic finance course must have instructor's permission. Basic techniques of analysis that are part of the core curriculum in a good business school are studied. Purpose is to give you background necessary for understanding and advising clients and for understanding other business-related law courses.

269T. Law of Financial Markets (2)
Discussion—2 hours. Introduction to the legal and regulatory issues presented by contemporary capital markets.

270. International Business Transactions (2)
Discussion—2 hours. Select legal problems arising from international business transactions. Topics include the international sales contract, letters of credit, transfers of technology, regulation of bribery, development of joint ventures, repatriation of profits, and foreign exchange problems.

270S. Special Session International Business Transactions (2)
Discussion—2 hours. A consideration of select legal problems arising from international business transactions. Topics include the international sales contract, letters of credit, transfers of technology, regulation of bribery, repatriation of profits, and national efforts to control imports.

271. Nonprofit Organizations and Drafting (3)
Discussion—4 hours. Prerequisite: course 215 or consent of instructor. Legal rules and concepts applicable to nonprofit organizations.

271A. Nonprofit Organizations: State and Local Governance Issues (2)
Discussion—2 hours. Prerequisite: course 215 (may be taken concurrently) or consent of instructor. State and local laws applicable to nonprofit organizations, i.e., public interest, cultural, religious, educational, and other not-for-profit entities. Federal tax exemptions of nonprofits, state and local laws impacting nonprofits with respect to incorporation or charitable trust formation, operation and governance, dissolution, fiduciary obligations of trustees and officers and directors, management and investment obligations vis-à-vis trust assets, cy pres, rights of members of social clubs, trade associations and labor unions, enforcement of obligations and rights by the attorney general and others, and regulation of charitable solicitation. Topics may include local property tax and other tax exemptions, nonprofit accounting issues public/private partnerships and Federal antitrust and constitutional constraints.

271B. Nonprofit Organizations: Tax Exemptions and Taxation Focus (2)
Discussion—2 hours. Prerequisite: course 215 or consent of instructor; course 220 recommended. Conceptual basis and substantive law criteria for the federal and state income tax exemption of nonprofit organizations and those particular circumstances and activities which will result in income taxation or financial sanction, including qualifications for exempt status, the nondistribution constraint, the inurement and private benefit concepts, limitations on campaign activities, permissible lobbying expenditures, the unrelated business income tax, the deduction for charitable contributions, intermediate sanctions, the differences between private foundations and public charities, special excise taxes, the exemption application process and reporting and disclosure requirements. Topics may include nonprofit accounting issues, local property tax and other local tax exemptions, and public/private partnerships.

272. Family Law (3)
Discussion—3 hours. An introduction to the legal regulation of the family.

274. Intellectual Property (3)
Discussion—3 hours. Provides a broad survey of intellectual property law.

274A. International Intellectual Property (2)
Discussion—3 hours. Prerequisite: prior or concurrent enrollment in course 274. Surveys the international aspects of copyright, patent and trademark law, including a look at basic international instruments, such as the Paris Convention, the Berne Convention, and Trade Related Aspects of Intellectual Property Rights of the World Trade Organization.

274AS. Summer Session Intellectual Property (2)
Discussion—2 hours This course provides a broad survey of the field of intellectual property. Areas covered will include trademarks, patents, trade secrets, idea protection, unfair competition, and copyright.

274D. Intellectual Property in Historical Context Seminar (2)
Seminar—2 hours. How the legal system has adapted to earlier periods of rapid change by creating, delimiting, and expanding intellectual property rights (IPRs). Required paper satisfies advanced writing requirement.

275. Complex Litigation (2)
Discussion—3 hours. Issues that frequently arise in large complex litigation involving multiple parties and multiple claims.

276. Juvenile Justice Seminar (2)
Seminar—2 hours. Legal and philosophical bases of a separate juvenile justice process for crimes committed by minors; police investigation, apprehension, and diversion; probation intake and detention; juvenile court hearing and disposition; juvenile corrections. The role of counsel at each phase of the process is examined.

277. Native American Law (2)
Seminar—2 hours. Legal relations between Native American tribes and the federal and state governments. Topics include the basic jurisdictional conflicts, which dominate this area of law and cover specific areas such as land rights, hunting and fishing rights, water rights, domestic relations law, and environmental protection. Religious freedom, repatriation. Issues regarding terminated and non-recognized tribes are also addressed.

277T. Indian Gaming Law Seminar (2)
Seminar—2 hours. Examines unique historical, political and legal context in which Indian tribes operate casinos, including impacts on tribal sovereignty, relations between tribes, states and local governments and changing relationships among the tribes themselves members, with particular reference to experience of California.

278. Pretrial Skills (2)
Discussion—2 hours. This course uses role-playing exercises, videotaped simulations, and related projects to introduce students to lawyering skills basic to the practice of law, including client interviewing, witness interviewing and discovery, including depositions. Limited enrollment.

279. Public Sector Labor Law (2)
Seminar—2 hours. Prerequisite: course 251 or consent of instructor. Application of private sector labor law doctrines to the public sector. Emphasis on the four California public sector statutes and the impact of constitutional law on public employees. Class presentation and seminar paper required. Satisfies advanced writing requirement. Limited enrollment.

280. Advanced Legal Writing: Analytical & Persuasive Writing (2)
Seminar—2 hours. Prerequisite: consent of instructor. Develop essay writing skills and performance test drafting typically employed on the bar examination. (S/U grading only.)

281. Local Government Law (3)
Discussion—2 hours. Explores the structure of state and local government through the lens of the virtues and flaws of the ideas of Madison and DeToqueville, i.e., centralized federal government vs. decentralized local government.

282. Energy Law Seminar (2)
Seminar—2 hours. The history, law, and public policy of energy regulation in the United States with an emphasis on economic and environmental regulation. Competitive restructuring of the natural gas and electric utility industries emphasized. The basic regulatory schemes for other energy sources such as hydroelectric power, coal, oil, and nuclear power explored. Recommended to anyone who has an interest in the energy sector, various models of economic regulation, or regulated industries.

283. Remedies (3)
Discussion—2 hours. Survey of modern American civil remedies law in both private and public law contexts. Topics addressed include equitable remedies, equitable defenses, contempt power, injunctive relief, restitution, and money damages in torts and contracts.

284. Law and Economics (3)
Discussion—3 hours. Introduces students to the economic analysis of law. We will explore several economic methods and concepts, including rational choice theory, behavioral economics, and utilitarianism. We will apply these tools to illuminate and critique familiar areas of law, including property, contracts, torts, criminal law, and civil procedure. Prior study of economics is not required.

285. Environmental Law (3)
Discussion—4 hours. An introduction to federal and state environmental law, including coverage of historical development of environmental law; the role of courts, the legislature and the executive branch in the development and implementation of environmental policy; allocation of authority among different levels of government; the role of market forces in environmental decisions; the major regulatory strategies that have been applied to control environmental harm, and enforcement of environmental law. Major statutes considered include the National Environmental Policy Act, Endangered Species Act, Clean Air Act and Clean Water Act.

285B. Environmental Practice (3)
Discussion—3 hours. Prerequisite: course 285 recommended. Examines underlying theory and practice in securing compliance with our major environmental laws.

285C. Agricultural Law and Policy (3)
Discussion—3 hours. An introduction to agricultural law, focusing on legal principles and issues at the forefront of contemporary debates about agriculture in society.

285D. Farmworkers and the Law (2)
Discussion—2 hours. Provides an overview of California and federal laws impacting farmworkers and how such laws have been applied to regulate working conditions in agriculture.

285T. California Environmental Issues Seminar (2)
Seminar—2 hours. The hem atop at ho logy of California has for many years been a national and global leader in environmental law and policy. Survey of key California environmental law and policy issues.

286. Health Care Law (3)
Discussion—3 hours. Addresses legal issues raised in three general areas: access to health care, health care financing, and quality of care. Course materials and discussion will focus on both public and private aspects of these issue areas.

286A. Topical Issues in Health Law (2)
Seminar—2 hours. The course focuses on four-six issues at the interface of law, medicine, bioethics, and health policy that are currently the subject of major litigation, legislation, and/or contentious debate in the domains of bioethics and public policy. Limited enrollment.

286B. Public Health Law (2)
Discussion—2 hours. Restricted to 15 students. Public health law, seen broadly, is the government's power and responsibility to ensure the conditions for the population's health.

286C. Bioethics (3)
Discussion—3 hours. Course examines the ethical and legal issues that arise from biomedical research and use of medical technologies. Limited enrollment. GE Credit: Wrt.

286D. Legal Psychology Seminar (2)
Seminar—2 hours. Examines how psychological theory and research can be used to shape laws and policies to make them better reflect what we know empirically about how individuals process information, make decisions and behave.

286E. Reproductive Rights, Law, and Policy (2)
Seminar—2 hours. Addresses a variety of laws and practices that affect reproductive health and procreative decision making. Limited enrollment.

287. Public Land Law (3)
Discussion—3 hours. Legal aspects of federal land management, including the history of public land law, authority over federal lands and specialized law dealing with particular natural resources and uses found on federal lands (minerals, timber, range, wildlife, recreation and preservation).

287A. Public Benefits Law (2)
Seminar—2 hours. Will explore the theory and practice of law pertaining to the enactment and administration of public benefits programs for poor and other disadvantaged persons in our society. Limited enrollment.

287T. Law and Society Seminar (2)
Seminar—2 hours. Study of law and society challenges traditional legal scholarship by exploring multiple ways in which law both shapes and is shaped by societies and social interactions. Seminar will introduce students to important literature and debates in the field. Limited enrollment.

288. Advanced Constitutional Law Seminar (2)
Seminar—2 hours. Prerequisite: Prior or concurrent enrollment in course 218 or 218A. Explores in-depth selected topics or problems in constitutional law and theory. Current focus is on the interpretation and application of the religion clauses of the First Amendment. Limited enrollment.

288B. Supreme Court Simulation Seminar (2)
Seminar—2 hours. Consideration in depth of approximately nine cases involving constitutional law that will be decided during the present term of the U.S. Supreme Court. Limited enrollment.

289A. Biotechnology Law and Policy (2)
Seminar—2 hours. Coverage includes the regulation of biotechnology research, including restrictions on cloning and fetal stem cell research; regulation of the products of biotechnology to protect human health or the environment, including restrictions on use or distribution of genetically modified organisms; the availability and scope of intellectual property protection for biotechnology products, including genes and engineered organisms; and the international law governing access to the natural resources that provide the starting materials for biotechnology and trade in bioengineered organisms or their products. Limited enrollment.

290. International Trade Dispute Seminar (2)
Seminar—2 hours. The WTO and other regional trading agreements, particularly the NAFTA, provide mechanisms for resolution of trade disputes. Students are introduced to economic, political, and legal theories underlying establishment of such bodies.

291A. International Finance (3)
Discussion—3 hours. How a framework of national and international laws and institutions regulates and fails to regulate the flow of money around the world.

291B. International Investment Dispute Seminar (2)
Seminar—2 hours. This seminar will examine the law of investor-State dispute resolution.

292. Immigration Law and Procedure (3)
Discussion—3 hours. Surveys the history of U.S. immigration law and policy.

293. Public Interest Law Seminar (2)
Seminar—2 hours. This class will examine the issues and problems associated with providing civil legal services to persons and interests in American society that typically have been unable to afford or otherwise obtain representation from the private bar.

294A. Law and Popular Culture (2)
Seminar—2 hours. This course examines works of popular culture, films, and legal texts. Each session will focus on a particular film and its cultural implications, particular problem or problems of law, law practice, legal ethics, traditional ethics, or public policy.—I. (I.)

295A. Trademark and Unfair Competition Law (2)
Discussion—2 hours. Prerequisite: course 274 recommended. We will take an intensive look at selected issues in Trademark Law, including the concepts of trademarks and unfair competition, acquisition and loss of trademark rights, infringement, trademarks as speech, and international aspects of trademark protection.

296. Copyright (3)
Discussion—3 hours. Thorough examination of the law of copyright, including its application to literature, music, films, television, art, computer programs, and the Internet. Issues addressed include copyright protection, the copyright owner's rights, the term of protection, copyright ownership and transfer, infringement, and defenses to infringement.

297. Alternative Dispute Resolution (3)
Discussion—3 hours. Introduces students to a wide variety of alternative dispute resolution procedures, with an emphasis on negotiation, mediation and arbitration. Limited enrollment.

298. Sociology of the Legal Profession Seminar (2)
Seminar—2 hours. Comprehensive look at the organization, operation, and ideology of the legal profession. Limited enrollment.

Professional Courses

400A. Study Abroad—University College Dublin, Ireland (12)
Independent study. Students must apply and be accepted into the International Study Abroad Program. Semester away study abroad at the University College Dublin, Ireland. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.)

400B. Study Abroad—University of Cophengen, Denmark (12)
Independent study. Students must apply and be accepted into the International Study Abroad Program. Semester study abroad at the University of Copenhagen, Denmark. Enhance knowledge of international legal regimes and obtain a global legal educational experience. (S/U grading only.)

400C. Study Abroad—China University of Political Science and Law (12)
Independent study. Students must apply and be accepted into the International Study Abroad Program. Semester-away study abroad at the China University of Political Science and Law. Enhance knowledge of international legal regimes and obtain a global legal educational experience.

408. Community Education Seminar (3)
Seminar/clinic—3 hours. Trains students to educate the community about basic legal rights and responsibilities. Students attend an initial four-hour orientation, followed by weekly seminars that will prepare students to teach in a local high school at least two times per week. Paper or journal required, to be determined by instructor. Limited enrollment. (S/U grading only.)

408A. Educational Policy and the Law Seminar (2)
Seminar—2 hours. Prerequisite: course 235 recommended. Examines the interaction between policy and the law of various educational themes such as the "right" to an education, financial equalization, merit and testing, privatization of education, and educational access. Limited enrollment.

409. Environmental Law Moot Court Competition (1)
During the first eight weeks of fall semester, students research and submit briefs as appellants, respondents, or third parties on a problem of environmental law that is prepared by the National Environmental Law Moot Court Board. Students attend four to six classes (including guest lectures) on aspects of appellate advocacy, legal writing, and environmental law. Members of the spring environmental law moot court team will be selected on the basis of performance in class. (S/U grading only.)

410A. Appellate Advocacy I (2)
Discussion/laboratory. Basic appellate practice and procedure. Beginning instruction in oral advocacy skills and an opportunity to practice these skills in front of a moot court. Limited enrollment. (S/U grading only.)

410B. Appellate Advocacy II (Moot Court) (2)
Practice—2 hours. Continuation of course 410A. Focuses on the development of effective appellate brief writing skills and the refinement of oral advocacy skills. Limited enrollment. (S/U grading only.)

411. Journal of International Law and Policy (1-2)
The Journal is a biannual journal produced by King Hall students with an interest in international law. The editor-in-chief of the journal receives two units of credit each semester. The managing editor receives one unit of credit each semester. (S/U grading only.)

411A. International Law Journal (1-2)
The Editor in Chief of the Journal of International Law and Immigration receives two credits for each semester of service. Only one person may receive this credit in any one semester as editor in chief. Managing and executive editors receive one unit. (S/U grading only.)

411B. Journal of Juvenile Law and Policy (1-2)
A biannual publication of the UC Davis School of Law that addresses the unique concerns of children in the American legal system. The editor-in-chief of the journal receives two credits each semester. Managing editors receive two credit each semester. (S/U grading only.)

411C. UC Davis Business Law Journal (1-2)
Run by dedicated law students who are committed to providing current and valuable legal and business analysis. The Journal addresses a broad spectrum of issues that fall within the intersection of business and the law. May be repeated two times for credit. (S/U grading only.)

412. Carr Intraschool Trial Advocacy Competition (1)
Competition—1 hour. Named after the late Justice Frances Carr, this competition is open to second- and third-year students. A preliminary round is followed by quarter-finals, semi-finals, and a final round. Students participate in mock trials presided over by judges and critiqued by experienced litigators. Limited enrollment. (S/U grading only.)

413. Interschool Competition (1-3)
Prerequisite: consent of appropriate faculty adviser. Participation in interschool moot court and lawyering skills competitions. Enrollment is limited to students actually representing the School in the interschool competitions. Competition must be authorized by the appropriate faculty adviser. The faculty adviser may condition the award of academic credit for any particular competition on the performance of such additional work as may be reasonable to justify the credit. May satisfy advanced legal writing requirement. (S/U grading only.)

414. Moot Court Board (1)
Prerequisite: courses 410A-410B. Members of Moot Court Board may receive one credit for each semester of service on the board, up to maximum of two. Credit awarded only after certification by Moot Court Board and approval of the faculty advisers to Moot Court Board. Limited enrollment. (S/U grading only.)

415. Trial Practice Honors Board (1)
Members of the Trial Practice Honors Board administer the Frances Carr competition. Members are nominated by their individual Trial Practice I adjuncts. Students receive one credit for serving on the Board, awarded upon approval of the faculty adviser. (S/U grading only.)

416. *Law Review* Writer (1-3)
The writing of a law review article under the editorial supervision of editors of the UC Davis Law Review. Office hours (including but not limited to Bluebooking and cite-checking) are required. 1 or 2 units, maximum 3 total units. In the spring semester, credit is obtained only upon achieving status as a member of the UC Davis Law Review, which requires that the student has made substantial progress towards completing an editorship article. Credit is awarded only after certification by the editor in chief and approval of the faculty advisors. One unit of credit is earned the first semester. Two units are earned the second semester upon nomination and acceptance of nomination to the Editorial Board. One unit is earned second semester if only a membership draft and office hours are completed. May be repeated for credit. (S/U grading only.)

417. *Law Review* Editor (1-2)
Editors must have completed an editorship article and must perform editorial duties requiring a substantial time commitment. Credit awarded only after certification by the editor-in-chief of the *Law Review* and approval of the faculty advisers to the *Law Review.* Students may receive four credits over two semesters for service as an editor. [In exceptional cases, students may petition to participate for one semester only and receive two credits.] (S/U grading only. Deferred grading pending only, pending completion of sequence.)

418. Environmental Law and Policy Journal (1-2)
Independent study. Each year nearly 100 King Hall students work together to publish Environs. Getting involved with the journal will provide you with the chance to develop essential skills that will benefit you throughout school and career. (S/U grading only.)

419. Advanced Writing Project (1-4)
The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirements. The number of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.)

419A. Advanced Writing Project (1-4)
The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirements. The number of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.)

419S. Special Session Advanced Writing Project (1-4)
The completion of a writing requirement project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. The writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten double-spaced pages, excluding footnotes. The project may take any of several forms, for example, a paper, a brief, a memorandum of law, a proposed statute, a statutory scheme or set of administrative regulations (with explanatory comments), or a will or agreement (with explanatory comments). The advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirements. The number of units shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (S/U grading only.)

420. Civil Rights Clinic (2-6)
Clinical activity. Prerequisite: prior or concurrent enrollment in course 219; priority given to students enrolled in or have taken course 267. Clinic provides practical experience in providing legal services to indigent clients who have filed civil rights actions in state and federal trial and appellate courts. Students work on clinic cases under the supervision of the clinic director. Limited enrollment. May be repeated for credit. (S/U grading only.)

425. Judicial Clinical (2 to 6 or 12)
Clinical program. Prerequisite: course 261 required for full-time clinical students and recommended for part-time clinical students. Students may arrange judicial clerkship clinical programs with an approved list of state and federal judges through the Clinical office and under the sponsorship of the faculty member in charge. All students must complete weekly time records and bi-weekly journals. Full-time clinical students must complete an evaluative final paper of approximately 10 pages. (S/U grading only.)

430. Clinical Program in Federal Taxation (2-6)
Clinical program. Prerequisite: course 220. Students will have the opportunity to work with the Internal Revenue Service or other governmental tax agency. Journals and attendance at group meetings are required. (S/U grading only.)

435. Family Protection Clinic (4)
Clinical activity. Prerequisite: course 219 (may be taken concurrently). Representation of low-income persons in family law and related matters arising out of situations involving family violence. Students are supervised by the staff attorney at the clinic's office located in Woodland at the Sexual Assault and Domestic Violence Center of Yolo County. (S/U grading only.)

440. Immigration Law Clinical (2 to 6 or 12)
Clinical program. Students may represent clients in administrative law hearings in San Francisco. Minimum units for the course are 4 and maximum is 12. Each unit assumes four hours work per week, including participation in the seminar, conference, and case research and development. Students who have completed course 292 may take the clinic for a minimum of 2 units. Limited enrollment. (S/U grading only.)

445. Legislative Process Externship (2-5)
Clinical activity. Prerequisite: course 240 (may be taken concurrently) or consent of instructor. Practical experience in the operation of the office of a legislator or a legislative committee. The major thrust of the program is to enable students to become familiar with the give and take realities of making laws, as contracted with their interpretation and enforcement. Journals are required. (S/U grading only.)

450. Environmental Law Externship (2-6)
Clinical activity—2-6 hours. Prerequisite: course 285 or consent of instructor. Practical experience in environmental law. Students will work in an approved government, non-profit or private law office engaged in some form of environmental law work for a minimum of 8 hours per week. Students must prepare a journal describing and reflecting upon their clinical experience, and meet periodically with the instructor.

455. Employment Relations Externship (2-6)
Clinical activity. Prerequisite: course 251 or 260 (may be taken concurrently). Practical experience in employment relations, including employment discrimination and public sector labor law. Work under the direct supervision of a government lawyer. Opportunity to participate in a range of with emphasis on observation and participation in actual investigation, interviewing, drafting pleadings, and attendance at hearings. (S/U grading only.)

460. Public Interest Law Clinical (2-6)
Clinical activity. Prerequisite: prior or concurrent enrollment in course 293 recommended. Students work with a public interest practitioner in a nonprofit organization. Journals and attendance at two group meetings are required. Clinical students must complete an evaluative final paper of approximately 8 pages. Hours completed in public interest setting may be applied toward the practicum requirement for the Public Interest Law Program. (S/U grading only.)

465. Intellectual Property Externship (2-6)
Clinical activity. Prerequisite: course 293 and Comparative Public Services recommended. Opportunity to work for government, academic, and nonprofit entities. (S/U grading only.)

470. Administration of Criminal Justice Externship (2-6 or 12)
Clinical activity—2-12 hours. Prerequisite: Completion of, or concurrent enrollment, in courses 219 and 227; course 263A recommended. Gain practical experience working full or part time in a District Attorney's or Public Defender's office in one of several surrounding counties or in a federal Public Defender or U.S. Attorney's office. Students participate in the many activities associated with the office for which they extern: observation, interviewing, research, counseling, motion practice, and trials under State Bar rules. Limited enrollment. (S/U grading only.)

475. Washington UC-DC Law Program (10)
Clinical activity—10 hours. Open to 2L and 3L students. Uniquely collaborative externship program in Washington, D.C., combining weekly seminars with full-time field placement offering students an unparalleled opportunity to learn how federal statutes, regulations, and policies are made, changed, and understood in the nation's capital. (S/U grading only.)

475A. Law Making and Law Changing in the Nation's Capital (3)
Seminar—3 hours. Companion seminar to the Washington UC-DC Externship. Designed to enhance the externship experience in three principal ways.

480. Clinical Program in Prison Law (2-6)
Clinical program. Provides practical experience in providing legal services to real clients who have various problems related to their incarceration in state prison. The services require analysis and application of Constitutional Law, state statutory law, agency regulations, and the rules of professional responsibility. Students will work under the direct supervision of the Prison Law clinical director and will be assigned a portion of the director's caseload. Students will be required to follow the law office procedure of the clinic and employ skills such as interviewing, research, writing, negotiating, and possibly, the preparation of legal documents to be filed in court. (S/U grading only.)

495. Legal Research and Writing I (2)
Discussion—2 hours. Integrated legal research and writing skills course. Basic legal research resources and strategies are introduced and practiced. (S/U grading only.)

498. Group Study (1-4)
Groups of students (not fewer than 4 or more than 10) with common interest in studying a stated legal problem may plan and conduct their own research

and seminar program, subject to the following regulations: (1) the program may extend over no more than two semesters; (2) the plan for the program and the list of members of the group must be submitted to Dean's office at least 4 weeks prior to opening of the semester in which the program is to begin; (3) a three-member faculty board will be appointed for each group proposed and will have authority to approve or disapprove the program and the amount of credit sought; (4) changes in the program or in membership of the group must be approved by the faculty board and normally will be approved only prior to the semester involved; (5) group members must conduct a weekly seminar session to be arranged by them; (6) each member of the group must submit an individual paper or an approved alternative growing out of the seminar subject to the faculty board; (7) S/U grading only unless the entire group requests letter grades in advance.

499. Independent Research Project (1-4)
Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member. (S/U grading only.)

499A. Independent Research Project (1-4)
Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member. Grading is on a Satisfactory/Unsatisfactory basis unless a request for letter grading has been made in advance.

499B. Law Students Study Away (10)
Independent study. Students studying away from UC Davis, School of Law. (S/U grading only.)

499C. Joint Degree Student-GSM (10)
Joint degree course for graduate School of Management students. (S/U grading only.)

499S. Special Independent Research Project (1-4)
Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member.

499SA. Special Session Independent Research Project (1-4)
Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member. (Deferred grading only, pending completion of sequence.)

499SB. Special Session Independent Research Project (1-4)
Students may receive credit for individual projects, subject to the following regulations: (1) the project may extend over no more than two semesters; (2) each project will be under the supervision of a faculty member; (3) an outline of the project must be approved by the supervising faculty member; (4) normally, no faculty member will be permitted to supervise more than five students working on individual programs during any semester; and (5) each student must submit an individual paper or approved alternative to the supervising faculty member.

Linguistics

(College of Letters and Science)

Patrick Farrell, Ph.D. Chairperson of the Department

Department Office. 177 Kerr Hall
(530) 752-9933; *http://linguistics.ucdavis.edu*

Faculty

Raúl Aranovich, Ph.D., Associate Professor
Robert J. Bayley, Ph.D. Professor
David Corina, Ph.D., Professor
Patrick Farrell, Ph.D., Professor
John A. Hawkins, Ph.D., Professor
Julia Menard-Warwick, Ph.D., Associate Professor
Almerindo E. Ojeda, Ph.D., Professor
C. Orhan Orgun, Ph.D., Associate Professor
Vaidehi Ramanathan, Ph.D., Professor
Lenora A. Timm, Ph.D., Professor

Emeriti Faculty

Wilbur A. Benware, Ph.D., Professor Emeritus
Maria I. Manoliu, Ph.D., Professor Emerita
David L. Olmsted, Ph.D., Professor Emeritus
Mary Schleppegrell, Ph.D., Professor Emerita
Gwendolyn Schwabe, M.A., Senior Lecturer Emerita
Maximo Torreblanca, Ph.D., Professor Emeritus
Benjamin E. Wallacker, Ph.D., Professor Emeritus

Affiliated Faculty

Angela Foin, M.A., Lecturer
Janet Lane, M.A., Lecturer
John Samsel, M.A., Lecturer
Kathleen Ward, Ph.D., Lecturer

The Major Program

Linguistics is the systematic study of human language. It focuses on theories of language structure, variation, and use, description of contemporary languages, and the examination of language change through time. Because of the pervasive influence of language in our everyday lives, work in linguistics interacts in important ways with studies carried out in many other fields, including psychology, anthropology, neuroscience, philosophy, computer science, sociology, literature, language teaching, communication and education.

The Program. An introductory lower division course provides students with basic concepts and some of the methods needed to analyze language in a systematic way. Upper division courses probe more deeply into specific aspects of language structure, language use, and the relationship of language to other realms of human activity.

Career Alternatives. Majors in linguistics find practical outlets for their linguistic training in a variety of fields: the computer science industry (software development); teaching English as a second language; foreign language teaching; elementary and secondary level bilingual-bicultural programs; language-oriented missionary work; bilingual-bicultural curriculum development (e.g., for publishing houses); legal work; speech therapy; lexicography (preparation of dictionaries). All these types of employment share an interest in persons skilled in the analysis of language, spoken and/or written—linguistics equips students with just such skills.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**4-24**
Linguistics 1	4
Foreign language, one course beyond the 15-unit requirement of the College of Letters and Science in the same language used to fulfill the college requirement	0-20
Depth Subject Matter	**44**
Linguistics 103A, 103B, 111, 131	16
Any three Linguistics courses from among those numbered from 110 to 159	12
One Linguistics course from among those numbered from 160 to 169	4
One Linguistics course from among those numbered from 170 to 189	4
At least eight upper division units from the following courses	8
requirements listed above, African American and African Studies 156, Anthropology 110, 117, 119, 120, Communication 105, Education 151, English 105, 106 French 109, 160, 161, 162, German 105, Human Development 101, Native American Studies 107, Philosophy 137A, 137B, 137C, Psychology 132, Spanish 111N, 112N, 113, 114N, 115, 115S, 116, 117, 118.	
Total Units for the Major	**48-68**

Major Adviser. R. Aranovich

Minor Program Requirements:

Linguistics offers two minor programs:

(1) General Linguistics, which provides the student with basic knowledge of language structure and linguistic analysis;

(2) Linguistics for Language Teachers, which especially complements the major in English with the Teaching Area of emphasis; it is also of relevance to students interested in teaching foreign languages.

	UNITS
General Linguistics	**24**
Linguistics 1, 103A, 103B	12
One course from Linguistics 111, 112, 121, 131, 141, 151, 152	4
Additional units selected from upper division Linguistics courses and other upper division courses listed in the major requirements in consultation with an adviser	8

	UNITS
Linguistics for Language Teachers	**24**
Linguistics 1, 106, 165	12
English 105	4
Linguistics 160 or 163	4
Linguistics 173 or Education 151	4

Minor Adviser. Same as Major adviser

Grading Recommendation. Though not required, it is recommended that all courses offered in satisfaction of the Linguistics major be taken for a letter grade.

Honors and Honors Program. The honors program consists of six units of 194H credit normally taken in the fall and winter quarters of the senior year. Completion of the program is a prerequisite for High or Highest Honors at graduation. Specific eligibility criteria may be obtained from the major adviser. For general information regarding graduation with honors and Dean's Honors Lists, please see Academic Information, on page 70.

Graduate Study. The Linguistics Graduate Group offers study and research leading to the M.A. and Ph.D. degrees. Please see Linguistics (A Graduate Group), on page 368; more detailed information may be obtained from the Graduate Adviser or from the Chairperson of the Linguistics Group.

Graduate Adviser. R.J. Bayley, V. Ramanathan

Courses in Linguistics (LIN)

Lower Division Courses

1. Introduction to Linguistics (4)
Lecture—3 hours; discussion—1 hour. Introduction to the study of language; its nature, diversity, and structure. GE credit: ArtHum or SocSci, Wrt.—I, II, III. (I, II, III.)

6. Language and Society (4)
Lecture—3 hours; discussion—1 hour. Language as a social phenomenon. Topics include linguistic diversity, language policy, language and identity, language and social structure, speech communities and social networks, the effect of social factors on language variation, linguistic consequences of language contact. GE Credit: Div, SocSci, Wrt.—II. Bayley, Ramanathan

20. Oral English for Undergraduate ESL Students (3)
Lecture/discussion—3 hours. Prerequisite: consent of instructor; limited primarily to students who have fulfilled their Subject A requirement or have completed course 23. Intensive practice in oral English for undergraduate ESL students. Students will learn to identify and modify features of their pronunciation which limit their ability to communicate clearly. Students will also learn and practice strategies for effective participation in academic tasks. May be repeated one time for credit with consent of coordinator. (P/NP grading only.)

21. Introduction to Reading and Composition for Non-Native Speakers (5)
Lecture/discussion—5 hours. Prerequisite: admission by placement examination only. Provides undergraduate students whose native language is not English with intensive work in reading and in writing organized, coherent, and grammatically correct paragraphs and short academic essays. (P/NP grading only.)

22. Intermediate Reading and Writing for Non-Native Speakers (4)
Lecture/discussion—4 hours. Prerequisite: admission by placement examination, by successful completion of course 21, or by consent of instructor. Provides undergraduate students whose native language is not English with experience in writing essays in recognized rhetorical modes. Students will also read to develop fluency and critical thinking and will study grammar needed for academic writing. (P/NP grading only.)

23. Advanced Reading and Composition for Non-Native Speakers (4)
Lecture/discussion—4 hours. Prerequisite: admission by placement examination, by successful completion of course 22, or by consent of instructor. Provides undergraduate students whose native language is not English with experience writing persuasive essays related to reading passages. Students will also read for tone, style, context, and assumptions and will study advanced grammar needed for persuasive essays. (P/NP grading only.)

24. English Structures and Strategies in Academic Writing (4)
Lecture/discussion—4 hours. Prerequisite: course 23. Practice in academic writing designed to prepare undergraduate students from language backgrounds other than English for successful academic work. Development of academic writing, critical thinking, and reading skills. Development of clear, accurate language for presenting an effective argument. Open to students from language backgrounds other than English.—Samsel

25. English for International/ESL Graduate Students (4)
Lecture/discussion—4 hours. Prerequisite: admission by placement examination or consent of instructor. Open to international and ESL graduate students and limited status international undergraduates (Education Abroad Program participants). A multi-skills ESL course designed to help international/ESL students improve their English language skills for successful academic study. Emphasis on writing, speaking, listening, reading, and academic culture. (P/NP grading only.)—I. Lane

26. Writing for International Graduate Students (3)
Lecture—3 hours. Prerequisite: satisfactory completion of course 25 if held for it, or consent of instructor. Admission limited to international graduate students. Focuses on writing needed for academic work, including summaries, critiques, research and grant proposals, memos, resumes, and research papers. Includes a review of grammar needed for writing and some focus on reading skills and American vocabulary and idioms. (P/NP grading only.)

27. Academic Writing for ESL Students (4)
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. Writing skills necessary for upper division courses, including skills crucial to writing lab and project reports, summaries, critiques, abstracts, and responses to exam questions. Includes practice with the syntax, grammar, and vocabulary characteristic of academic writing. (P/NP grading only.)

28. Reading in Scientific and Technical Subjects for ESL Students (4)
Lecture/discussion—4 hours. Instruction and practice in reading scientific and technical texts. Techniques for comprehending and analyzing grammatical and organizational patterns. Notetaking skills, summarizing, vocabulary enrichment. (P/NP grading only.)

96. Directed Group Study in English as a Second Language (1-5)
Variable—1-5 hours. Prerequisite: consent of instructor. Directed group study of topic in English as a Second Language (ESL). May be repeated for credit by consent of the ESL coordinator. (P/NP grading only.)—I, II, III.

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Intended for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. Intended for lower division students. (P/NP grading only.)

Upper Division Courses

103A. Linguistic Analysis I: Phonetics, Phonology, Morphology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on phonetic, phonological, and morphological phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed course 139.—I. Farrell, Orgun

103B. Linguistic Analysis II: Morphology, Syntax, Semantics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to fundamental methods and concepts used in linguistic analysis, focusing on morphological, syntactic, and semantic phenomena. Emphasizes development of analytical skills and appreciation of structural regularities and differences among languages. Not open for credit to students who have completed course 140.—II. Farrell, Aranovich

105. Topics in Language and Linguistics (4)
Lecture—3 hours; term paper. Prerequisite: course 1 and consent of instructor. Detailed examination of a major contemporary linguistic theory, a major contemporary issue or related set of issues in linguistics, or the structure of a particular language or language family. May be repeated for credit when topic differs. Offered irregularly.

106. English Grammar (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or English 3 or University Writing Program 1 or consent of instructor. Survey of present day English grammar as informed by contemporary linguistic theories. The major syntactic structures of English; their variation across dialects, styles, and registers, their development, and their usefulness in describing the conventions of English. (Same course as English 106.) Not open for credit to students who have completed course 104. GE credit: ArtHum.

111. Introduction to Phonological Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A. Contemporary phonological theory with emphasis on syllable structure, metrical structure, phonology-morphology interaction, and typological variation in these areas, from the perspective of optimality-theoretic approaches.—II. Orgun

112. Phonetics (4)
Lecture—3 hours; term paper. Prerequisite: course 1. Detailed examination of articulatory and acoustic phonetics.—I. Orgun

121. Morphology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 103A, 103B. Introduction to the analysis of word structure and the relation of word structure to the lexicon and other grammatical components.—III. Aranovich

131. Introduction to Syntactic Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 103B. Introduction to syntactic theory, primarily through the examination of a major theory of syntax, emphasizing theoretical reasoning, argumentation, and problems of theory building in syntax.—III. Aranovich, Farrell

141. Semantics (4)
Lecture—3 hours; term paper. Prerequisite: course 103B. The linguistic study of meanings of words and phrases. Meanings expressed by lexical items and derivational and inflectional morphology. Contribution of argument structure, quantification, and coordination to meaning. GE credit: Wrt.—I. Ojeda

150. Languages of the World (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Anthropology 4. Survey of the world's languages, their geographical distribution and classification, both genetic and typological. Illustrative descriptions of several major languages from different geographical areas; pidgins and creoles, lingua francas and other languages of widespread use. Not open for credit to students who have completed course 50. GE credit: ArtHum or SocSci, Wrt.—II.

151. Historical Linguistics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A. Description and methods of the historical study of language, including the comparative method and internal reconstruction; sound change, morphological change, syntactic change, semantic change. Offered irregularly.—Hawkins

152. Language Universals and Typology (4)
Lecture—3 hours; term paper. Prerequisite: course 103B. Investigation into common features of all human languages and the classification of languages in terms of their structural features. Theories of universal grammar. Detailed discussion of non-Indo-European languages and comparison with English. GE credit: Wrt.—III. Farrell, Hawkins

160. American Voices (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Anthropology 4 or upper division standing recommended. Explores the forms of American English; traditional notions of regional dialects and increasingly important social dialects, reflecting age, class, gender, race, ethnicity, and sexual orientation. The influence of language attitudes on perception of dialect speakers; dialect in media, education, and literature. GE credit: SocSci, Div, Wrt.—III. Ward

163. Language, Gender, and Society (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Anthropology 4. Investigation of real and putative (stereotyped) gender-linked differences in language structure and usage, with a consideration of some social and psychological consequences of such differences. Focus is on English, but other languages are also discussed. GE credit: SocSci, Div, Wrt.—II. Timm, Menard-Warwick

165. Introduction to Applied Linguistics (4)
Lecture—3 hours; discussion—1 hour. Applications of linguistic principles and the analysis of language-related issues in the world. Exploration of a range of language-related problems including issues related to language learning and teaching to issues concerning language and gender, race, class and the media.—(III.) Ramanathan

166. The Spanish Language in the United States (4)
Lecture—3 hours; term paper. Prerequisite: course 1 or Spanish 111N; and Spanish 23 or the equivalent. Linguistic features of the varieties of the Spanish language spoken throughout the United States; phonology, morphology, syntax, vocabulary. Focus on the relationship between United States Spanish and other world varieties of Spanish, within a historical framework. GE credit: Div, Wrt.

171. Introduction to Psycholinguistics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; courses 103A, 103B recommended. Introduction to psychological issues relating to the implementation of language and linguistic structure during speech production and comprehension and to the implications of research in psychology and related fields for linguistic theory. Offered in alternate years. GE credit: SocSci.—Corina

173. Language Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor; courses 103A, 103B. Theory and research on children's acquisition of their native language, including the sound system, grammatical systems, and basic semantic categories. (Same course as Education 173.)—(I.) Uchikoshi

175. Biological Basis of Language (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Overview of issues in the field of neurolinguistics and techniques used to explore representation of language in the human brain. GE credit: SciEng.—I. Corina

177. Computational Linguistics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Understanding the nature of language through computer modeling of linguistic abilities. Relationships between human cognition and computer representations of cognitive processing. Not open for credit to students who have completed course 7. GE credit: SocSci.—II. Ojeda

180. Second Language Learning and Teaching (4)
Lecture/discussion—4 hours; fieldwork; project. Prerequisite: course 1 or equivalent. Psycholinguistic and sociolinguistic theories of second language learning. Connections between theoretical perspectives and pedagogical practices in formal and informal second language settings, with focus on tutoring. Impact of sociocontextual factors (e.g., gender, ethnicity). Fieldwork requirement. GE credit: Div, Wrt.—I. Menard-Warwick

182. Multilingualism (4)
Lecture/discussion—4 hours. Issues in multilingualism from a global perspective: e.g., multilingual communities; multilingualism and identity (gender, ethnicity, nationality); language ideologies and educational and sociopolitical policies surrounding multilingualism; acquisition of multilingualism; discursive practices of multilinguals. Limited enrollment. GE credit: ArtHum or SocSci, Div, Wrt.—III. Ramanathan, Timm

192. Internship in Linguistics (1-12)
Internship—3-36 hours; two written reports. Prerequisite: course 1 or the equivalent. Internship applying linguistic-related skills to a fieldwork project in areas such as media, law, or industry, in approved organizations or institutions. Maximum of 4 units applicable toward major. (P/NP grading only.)

194H. Special Study for Honors Students (1-5)
Independent study—1-5 hours. Prerequisite: open only to linguistics majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis. May be repeated for credit for up to 6 units. (P/NP grading only.)

197T. Tutoring in Linguistics (1-4)
Discussion—1-4 hours. Prerequisite: upper division standing, consent of instructor, and consent of department chairperson. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

200A. Foundations of Linguistics I (4)
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing. Survey of fundamental issues raised by pre-generative linguistics in the twentieth century, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed course 203A.

200B. Foundations of Linguistics II (4)
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing. Survey of fundamental issues raised by orthodox generative linguistics, with emphasis on issues crucial to applications of linguistics. Not open for credit to students who have completed course 203B.

200C. Foundations of Linguistics III (4)
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing. Survey of fundamental issues raised by contemporary linguistic theories lying outside the generative grammar orthodoxy, with emphasis on issues crucial to applications of linguistics.

205A-205B-205C-205D. Topics in Linguistic Theory and Methods (4)
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study of current problems in linguistic theory and methodology. May be repeated for credit when topic differs.

211. Advanced Phonological Theory and Analysis (4)
Lecture—3 hours; term paper. Prerequisite: course 111. Critical examination of current phonological theories.—Orgun

212. Advanced Phonetics (4)
Lecture—3 hours; term paper. Prerequisite: course 112. Advanced investigation of the physiological basis of speech articulation and acoustic phonetics. Offered in alternate years.—Orgun

231. Advanced Syntactic Theory and Analysis (4)
Lecture—3 hours; term paper. Prerequisite: course 131. Critical survey of contemporary theories of syntax. Offered in alternate years.—Aranovich

241. Advanced Semantic Theory and Analysis (4)
Lecture—3 hours; term paper. Prerequisite: course 141 or consent of instructor. Advanced critical exploration of contemporary theories of linguistic semantics. Offered in alternate years.—II. Ojeda

251. Principles of Historical Linguistics (4)
Lecture—3 hours; term paper. Prerequisite: course 151. Advanced analysis of the theory and methods of historical linguistics. Offered in alternate years.

252. Romance Linguistics (4)
Lecture—3 hours; term paper. Prerequisite: course 151. Examination of the development of the Romance languages from Proto-Romance to the modern era. Application and critical examination of methods of historical and comparative linguistics in particular areas of structural change in Romance. Offered irregularly.

260. Variation in Speech Communities (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 281 or consent of instructor. Linguistic variability in time, space, and society. Theoretical issues related to social and linguistic constraints in variation; issues and methods in the quantitative analysis of variation. Speech community, quantitative analytic methods, and the scope of sociolinguistic competence.—Bayley

263. Discourse Analysis: Text in Context (4)
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing. Introduction to and application of leading theoretical approaches to the analysis of discourse. Approaches to the analysis of (spoken and written) text in context, tools for analyzing different types of texts (narration, conversation, etc.). Theme/rheme, given/new, anaphora, discourse markers, and other lexical/grammatical features.

264. Current Issues in Language and Gender (4)
Seminar—3 hours; term paper; project. Prerequisite: graduate standing; prior coursework in Linguistics, Gender Studies, or Cultural Studies is desirable; no expectation of bilingual proficiency. Exploration of the construction and performance of gender through language in cross-cultural perspective and in a variety of contexts: informal conversations, narratives, workplaces, schools, households, the mass media. Special topics may include: language acquisition; multilingualism; ecofeminism; queer theory. May be repeated for credit one time when topic differs. Offered in alternate years—Menard-Warwick, Timm

265. Language, Performance, and Power (4)
Seminar—3 hours; term paper. Graduate standing or consent of instructor. Exploration of the intersection between linguistic and social theories in the language-state relation and the performance of identity. Ideological sources of language differentiation; nation-building and linguistic difference. Political economic, sociolinguistic, and ethnographic approaches to understanding linguistic inequality. (Same course as Anthropology 265.) Offered in alternate years.—Shibamoto Smith

280. Theories of Second Language Acquisition (4)
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Covers theoretical perspectives that direct or have directed research in second language acquisition; explores the relationship between linguistics and language teaching and deals with the individual variables that influence second language learning.—I. Ramanathan

281. Research Methods in TESOL/SLD (4)
Lecture—3 hours; term paper. Prerequisite: course 280. Research methods in second language research; evaluation of research designs and methods of analyses, formulation of research questions and hypotheses and design of study with thought to various kinds of data.—II. Menard-Warwick, Bayley

282. Individual and Social Aspects of Bilingualism (4)
Lecture—3 hours; term paper. Broad overview of bi- and multilingualism, with focus on theoretical and descriptive research; topics covered range from language processing in bilinguals to code-switching to language as political issue in multilingual states.—III. Timm

283. Politics of Bi and Multilingual Literacies (4)
Lecture/discussion—3 hours; term paper. Anthropological, psycho-social, political, and educational perspectives on bi and multilingualism. Power, colonialism, "native/non-native" speakers, and varieties and the unequal distribution of social goods. Analysis of how competing factors keep peoples disenfranchised.—Ramanathan

289. Pedagogical Applications of Second Language Acquisition Theory (4)
Seminar—3 hours; term paper. Prerequisite: course 280. Pedagogical implications of various theories of second language acquisition, facilitation of language acquisition in classroom settings, and techniques for conducting classroom-based research in language learning.—Bayley

297T. English as a Second Language Teaching/Tutoring (1-4)
Tutoring—1-4 hours. Prerequisite: course 300, 301, or 302 (may be taken concurrently). Teaching classes for ESL graduate students. Aiding the ESL undergraduate composition classes; tutoring foreign graduate student Teaching Assistants in pronunciation. Does not fulfill requirement toward the M.A. degree. May be repeated for credit. (S/U grading only.)

298. Directed Group Study (1-5)
Prerequisite: graduate standing. (S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Courses

300. Language Pedagogy (4)
Lecture—3 hours; tutorial; project; practice. Prerequisite: graduate standing; admission to MA in Applied Linguistics program or consent of instructor. Methods of teaching second languages to nonnative speakers, stressing particularly recent linguistic methodology and techniques. Teaching and tutoring in the UC Davis ESL program.—I. Menard-Warwick

301. Teaching Academic Literacy (4)
Seminar—3 hours; tutorial—14 hours; project; practice. Prerequisite: graduate standing; course 300 or consent of instructor. Methods of teaching advanced academic literacy in a second language, with a focus on ESL composition. Lesson development, teaching and tutoring in the UC Davis ESL program.—II. Ramanathan

302. Recent Research and Special Projects in TESOL (4)
Lecture—4 hours. Prerequisite: courses 300 and 301. Review of recent research in second language acquisition and the teaching of English to speakers of other languages. Continued teaching and tutoring in the UC Davis ESL clinic. Each student also designs and reports on a classroom research project.

305. Second Language Literacy and Technology (4)
Lecture/discussion—1.5 hours; web electronic discussion—1.5 hours. Prerequisite: course 2, or equivalent coursework/experience in second language pedagogy; consent of instructor; graduate students only. Exploration of literacy theory and critical pedagogy in relation to new instructional and communication technologies. Practicum experience in teaching second language literacy; reflection on connections between theory and practice. Limited enrollment.—Menard-Warwick

310. Language Pedagogy for Teacher Educators (4)
Seminar—3 hours; tutorial; project; fieldwork. Prerequisite: admission to Ph.D. program in Linguistics or Foreign Languages, or permission of instructor; significant language teaching experience. Current issues in second language pedagogy, with a focus on communicative methodology, participatory curriculum design, academic literacy, and the social contexts of teaching. Emphasis on reflective teaching and action research. May be repeated up to 12 units for credit.—I. Menard-Warwick, Ramanathan

391. Oral English for ESL Students (3)
Lecture—2 hours; laboratory—2 hours. Prerequisite: open only to non-native speakers of English with priority enrollment to international student teaching assistants; completion of any required ESL courses or consent of instructor. Course gives non-native English-speaking students, particularly international student teaching assistants, intensive work in oral English to increase fluency, accuracy, and use of appropriate discourse strategies in academic settings (e.g., seminar, discussion, laboratory). Course may be repeated for credit with consent of coordinator. (S/U grading only.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III.

Linguistics (A Graduate Group)

Robert Blake, Chairperson of the Group

Group Office. 184 Kerr Hall
(530) 752 3464

Faculty

Moradewun Adejunmobi, Ph.D., Professor *(African American and African Studies)*
Raúl Aranovich, Ph.D., AssociateProfessor *(Linguistics)*
Carlee Arnett, Ph.D., Assistant Professor *(German)*
Robert Blake, Ph.D., Professor *(Spanish)*
Travis G. Bradley, Ph.D., Associate Professor *(Spanish)*
Chengzhi Chu, Ph.D., AssociateProfessor *(East Asian Languages and Cultures)*
M.Cecilia Colombi, Ph.D., Professor *(Spanish)*
David Corina, Ph.D., Professor *(Linguistics)*
Kerry Enright, PH.D., Assistant Professor *(Education)*
Patrick Farrell, Ph.D., Professor *(Linguistics)*
John A. Hawkins, Ph.D., Professor *(Linguistics)*
Michael Glanzberg, Ph.D., Professor *(Philosophy)*
Debra Long, Ph.D., Professor *(Psychology)*
Martha Macri, Ph.D., Professor *(Native American Studies)*
Robert May, Ph.D., Professor *(Philosophy)*
Julia Menard-Warwick, Ph.D., Associate Professor *(Linguistics)*
Barbara Merino, Ph.D., Professor *(Education)*
Flagg Miller, Ph.D, Associate Professor *(Religious Studies)*
Almerindo E. Ojeda, Ph.D., Professor *(Linguistics)*
C. Orhan Orgun, Ph.D., Associate Professor *(Linguistics)*
Vaidehi Ramanathan, Ph.D., Professor *(Linguistics)*
Winfried Schleiner, Ph.D., Professor *(English)*
Adam Sennet, Ph.D., Assistant Professor *(Philosophy)*
Janet S. Shibamoto-Smith, Ph.D., Professor *(Anthropology)*
Tamara Swaab, Ph.D., Associate Professor *(Psychology, Center for Mind and Brain)*
Lenora A. Timm, Ph.D., Professor *(Linguistics)*
Matthew Traxler, Ph.D., Professor *(Psychology)*
Yuuko Uchikoshi, Ed.D, Assistant Professor *(Education)*
Kerry Villalva, Ph.D., Assistant Professor *(Education)*
Karen A. Watson-Gegeo, Ph.D., Professor *(Education) Distinguished Graduate Mentoring Award*
Eric Russell Webb. Ph.D., Assistant Professor *(French)*
Aram Yengoyan, Ph.D., Professor *(Anthropology)*

Emeriti Faculty

Wilbur A. Benware, Ph.D., Professor Emeritus
David L. Omsted, Ph.D. Professor Emeritus
Mary Schleppegrell, Ph.D., Professor Emerita
Gwendolyn Schwabe, M.A., Senior Lecturer Emerita
Maximo Torreblanca, Ph.D., Professor Emeritus
Benjamin E. Wallacker, Ph.D., Professor Emeritus

Graduate Study. The Graduate Group in Linguistics offers a program of study leading to the M.A. and the Ph.D. degree. The M.A. places emphasis on applied linguistics, especially TESOL. The program offers a strong foundation in linguistics and in the linking of the theory with practice. Students have the choice of pursuing one of two sets of degree requirements. Plan I requires a total of 38 units of course work plus a thesis. Plan II requires 42 units of course work and an examination consisting of two papers. The Ph.D. degree offers advanced training and research in linguistic theories and methods. Second language acquisition and development is a particular emphasis of the program. Detailed information on both the M.A. and the Ph.D. degrees can be obtained from the graduate advisor, from the chair of the Graduate Group or the departmental chair.

Graduate Advisers. Robert Bayley *(Linguistics)*, Vaidehi Ramanathan *(Linguistics)*

Literature in Translation

The following courses are open to students throughout the campus. The readings can be in English. See departmental listing for the course description.

Chinese

10. Modern Chinese Literature (in English)
11. Great Books of China (in English)
50. Introduction to the Literature of China and Japan (in English)
100A. Daoist Traditions
101. Chinese Film
102. Chinese American Film
103. Modern Chinese Drama
104. Twentieth-Century Chinese Fiction (in English)
105. Western Influences on Twentieth-Century Chinese Literature (in English)
106. Chinese Poetry (in English)
107. Traditional Chinese Fiction (in English)
108. Poetry of China and Japan (in English)
109A-I. Topics in Chinese Literature (in English)
110. Great Writers of China: Texts and Context (in English)

Classics

10. Greek, Roman, and Near Eastern Mythology
140. Homer and Ancient Epic
141. Greek and Roman Comedy
142. Greek and Roman Novel
143. Greek Tragedy

Comparative Literature

1. Great Books of Western Culture: The Ancient World
2. Great Books of Western Culture: From the Middle Ages to the Enlightenment
3. Great Books of Western Culture: The Modern Crisis
4. Major Books of the Contemporary World
5. Fairy Tales, Fables and Parables
6. Myths and Legends
7. Literature of Fantasy and the Supernatural
8. Utopias and their Transformations
9. The Short Story and Novella
10A-N. Master Authors of World Literature
12. Introduction to Women Writers
13. Dramatic Literature
14. Introduction to -Poetry
20. Humans and the Natural World
25. Ethnic Minority Writers in World Literature
53A. Literature of China and Japan
53B. Literature of India and Southeast Asia
53C. Literatures of the Islamic World
100. World Cinema
120. Writing Nature: 1750 to the Present
135. Women Writers
138. Gender and Interpretation
139. Shakespeare and the Classical World
140. Thematic and Structural Study of Literature
141. Introduction to Critical Theoretical Approaches to Literature and Culture
142. Critical Reading and Analysis
144. The Grotesque
145. Representations of the City

146. Myth in Literature
147. Modern Jewish Writers
151. Colonial and Postcolonial Experience in Literature
152. Literature of the Americas
153. The Forms of Asian Literature
154. African Literature
155. Classical Literature of the Islamic World
157. War and Peace in Literature
158. The Detective Story as Literature
159. Women in Literature
160A. The Modern Novel
160B. The Modern Drama
161A. Tragedy
161B. Comedy
163. Biography and Autobiography
164A. The Middle Ages
164B. The Renaissance
164C. Baroque and Neoclassicism
164D. The Enlightenment
165. Caribbean Literature
166. Literature of the Modern Middle East
166A. The Epic
166B. The Novel
167. Comparative Study of Major Authors
168A. Romanticism
168B. Realism and Naturalism
169. The Avant-Garde
170. The Contemporary Novel
180. Selected Topics in Comparative Literature
194H. Special Study for Honors Students
195. Seminar in Comparative Literature

Dramatic Art

20. Introduction to Dramatic Art
156B. History of Theatre and Dance: 1650-1900
156C. History of Theatre and Dance: The Twentieth Century
159. Contemporary Experimental Theatre and Drama

French

50. French Film
51. Major Works of French
52. France and the French-Speaking World

German

48. Myth and Saga in the Germanic Cultures
49. Freshman Colloquium
112 Topics in German Literature
113. Goethe's Faust
115 German Literature since 1945
118A. Fin-de-siècle Vienna (The Swan Song of the Habsburg Empire)
118B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism
118C. Germany under the Third Reich
119. From German Fiction to German Film
141. The Holocaust and its Literary Representation
142 New German Cinema: From Oberhausen to the Present

Italian

50. Studies in Italian Cinema
107. Survey of Italian Culture and Institutions
108. Contemporary Issues in Italian Culture and Society
139B. Boccaccio, Petrarch and the Renaissance
140. Italian Literature in English Translation: Dante, Divine Comedy
141. Culture, Gender and the Italian Renaissance
142. Masterpieces of Modern Italian Narrative
150. Studies in Italian Cinema

Japanese

10. Masterworks of Japanese Literature (in English)
15. Introduction to Traditional Japanese Culture
50. Introduction to the Literature of China and Japan
101. Japanese Literature in Translation: The Early Period
102. Japanese Literature in Translation: The Middle Period
103. Japanese Literature in Translation: The Modern Period
104. Modern Japanese Literature: War and Revolution
105. Modern Japanese Literature: Hero and Anti-Hero
106. Japanese Culture through Films
107. Modern Japanese Autobiographics (in English)
108. Poetry of China and Japan
152. Traditional Japanese Drama

Native American Studies

181A. Native American Literature (the novel and fiction)
181B. Native American Literature (non-fiction works by Native authors)
181C. Native American Literature (traditional and contemporary poetry)
184. Contemporary Indigenous Literature of Mexico
188. Special Topics in Native American Literary Studies

Russian

41. Survey of Nineteenth-Century Russian Literature
42. Survey of Twentieth-Century Russian Literature
44. Children's Literature in Russia
45. Russian Fantasy
121. Nineteenth-Century Russian Prose
123. Twentieth-Century Russian Prose
126. The Russian Theater
130. Contemporary Soviet Culture
131. Contemporary Russian Culture
132. Nature and Culture in Russia
140. Dostoevsky
141. Tolstoy
144. Christ and Literature
150. Russian Culture
151. Writers and Censorship in Russia and the Soviet Union
154. Russian Folklore
166. Representations of Sexuality in Russian Literature

Spanish

149. Latin-American Literature in Translation

Management, Graduate School of

Steven C. Currall, Ph.D., Dean

Donald A. Palmer, Ph.D., Associate Dean

David L. Woodruff, Ph.D., Associate Dean

James Stevens, M.B.A., Assistant Dean

School Office. Gallagher Hall
(530) 752-7658

Faculty

Ashwin Aravindakshan, Ph.D., Assistant Professor
Brad M. Barber, Ph.D., Professor
Beth Bechky, Ph.D., Associate Professor
Hemant Bhargava, Ph.D., Professor
Nicole W. Biggart, Ph.D., Professor
David S. Bunch, Ph.D., Professor
Joseph Chen, Ph.D., Associate Professor
Rachel Chen, Ph.D,. Assistant Professor
Gina Dokko, Ph.D, Assistant Professor
Roger Edelen, Ph.D., Assistant Professor
Kimberly D. Elsbach, Ph.D., Professor
Paul A. Griffin, Ph.D., Professor
Andrew Hargadon, Ph.D., Professor
Greta Hsu, Ph.D., Assistant Professor
Renna Jiang, Ph.D., Assistant Professor
Michael Maher, Ph.D., Professor
Prasad Naik, Ph.D., Professor
N.V. Ramanan, Ph.D., Assistant Professor
Anna Scherbina, Ph.D., Assistant Professor
Olivier Rubel Ph.D., Assistant Professor
Victor Stango, Ph.D. Assistant Professor
Chih-Ling Tsai, Ph.D., Professor
Catherine Yang, Ph.D., Assistant Professor
Ayako Yasuda, Ph.D., Assistant Professor
Michelle Yetman, Ph.D., Associate Professor
Robert Yetman, Ph.D., Associate Professor
Hema Yoganarasimhan, Ph.D., Assistant Professor
Ning Zhu, Ph.D., Associate Professor

Emeriti Faculty

Richard P. Castanias, Ph.D., Professor Emeritus
Peter K. Clark, Ph.D., Professor Emeritus
Richard C. Dorf, Ph.D., Professor Emeritus
Eitan Gerstner, Ph.D., Professor
Michael R. Hagerty, Ph.D., Professor Emeritus
Alexander F. McCalla, Ph.D., Professor Emeritus
Robert H. Smiley, Ph.D., Professor
Jerome J. Suran, B.S., Ph.D. (hon.), Senior Lecturer Emeritus
Donald Topkis, Ph.D., Professor Emeritus

The Graduate School of Management offers a minor in Technology Management to undergraduate students with majors in engineering, agricultural, biological and physical sciences. This minor complements students' undergraduate studies with courses in the ways in which engineering and science-based industrial enterprises manage and use knowledge from science, engineering and technology. The minor also provides students with business and management skills that should enable them to use their engineering and science education more effectively in a technology environment.

Due to limited enrollment, students need to apply to the program. The primary admission process will be conducted in the spring quarter before student registration for fall courses. Subsequent admissions processes will be held as needed for students to enter the minor in winter and spring quarters.

Minor Prerequisites:

Students must take these courses for a letter grade of *C-* or better.

Management 11A ..... 4 units
Mathematics 16A-16B, 17A-17B or 21A-21B .....6-8 units
Statistics any 100 level course or above..... 4 units

Minor Program Requirements:

UNITS

Technology Management 20
Choose five courses from Management 120, 140, 150, 160, 170, 180 20

Courses in Management (MGT/MGB/MGP)

Lower Division Courses

11A. Elementary Accounting (4)
Lecture—3 hours; discussion—1 hour. Basic concepts of accounting; interpreting and using financial statements; understanding accounting principles.—I, II. (I, II.)

11B. Elementary Accounting (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A. Product costing; using accounting information for decision making; planning and performance evaluation.—III. (III.)

Upper Division Courses

100. Introduction to Financial Accounting (3)
Lecture—3 hours. Course is open to all upper division undergraduate and graduate students, except those in the Graduate School of Management. Intro-

duction to the concepts, methods, and uses of accounting and financial reporting. Preparation of financial statements, including balance sheet and statements of income and cash flow, as well as their analysis by investors and managers.

120. Managing and Using Information Technology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A, Mathematics 16B, 17B, or 21B, Statistics 100, 102, 103, or 108. Introduction to computer hardware, systems software, and information systems. Management of information technology and the impact of information systems on modern management.—III. Bhargava

140. Marketing for the Technology-Based Enterprise (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A, Mathematics 16B, 17B, or 21B, Statistics 100, 102, 103, or 108. Marketing in technology-based companies, with emphasis on how scientists, engineers, and business people interact to develop and market products and services.—II. Hagerty

150. Technology Management (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A, Mathematics 16B, 17B, or 21B, Statistics 100, 102, 103, or 108. Management of firms in high technology industries such as software development and biotechnology research. Motivating and managing workers, organizing for innovation, and making decisions.—III.

160. Financing New Business Ventures (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A, Mathematics 16B, 17B, or 21B, Statistics 100, 102, 103, or 108. Concepts and methods used to structure and finance new business ventures. Topics include the evaluation of new investment projects, raising venture capital, the role of the venture capitalist, and the choice of organizational structure in new ventures.—II. Castanias

170. Managing Costs and Quality (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A, Mathematics 16B, 17B, or 21B, Statistics 100, 102, 103, or 108. Designing cost systems in high technology organizations and managing operations to maximize quality and minimize costs. Topics include activity based costing and management, managing quality and time to create value, ethical issues in cost assignment, and differential costing for decision making.—I. Maher

180. Supply Chain Planning and Management (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A, Mathematics 16B, 17B, or 21B, Statistics 100, 102, 103, or 108. Quantitative techniques for analysis and management of modern supply chains for the production and delivery of goods and services.—I. Woodruff

Graduate Courses—Core Courses

200A. Financial Accounting (3)
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Introduction to the concepts and objectives underlying the preparation of financial statements. Topics include understanding the accounting cycle, measurement and valuation problems associated with financial statement components, consideration of the usefulness of financial statements in the analysis of a corporation's operations.—I. (I.) Yetman

200B. Managerial Accounting (3)
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Information managers should know to be effective, including: product costing, motivating people, and differential analysis for decision making. Includes team projects and written and oral presentations.—II, IV. (II, IV.) Ramanan

201A. The Individual and Group Dynamics (3)
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Examines basic psychological and social psychological processes shaping human behavior and applies knowledge of these processes to the following organizational problems: motivation, job design, commitment, socialization, culture, individual and group decision making, and team building.—I. (I.) Elsbach

201B. Organizational Structure and Strategy (3)
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Analysis of structural properties of organization including differentiation and vertical and horizontal integration. Alternative structural arrangements including functional, divisionalized, matrix, and hybrid structures. Relationship between environment, structure, and strategic objectives. Organization life cycle and changes.—II. (II.) Biggart, Hsu

202A. Markets and the Firm (3)
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Examines the interaction of consumers, firms and government, and the effect this interaction has on the use of resources and firm profitability. Fundamental economic concepts such as marginal analysis, opportunity cost, pricing, and externalities are introduced and applied.—II. (II.)

202B. Business, Government, and the International Economy (3)
Lecture—3 hours. Prerequisite: course 202A. Examines the influence of government and international factors on business. Topics include distribution of income, business cycles, inflation and interest rates, the federal debt, monetary policy and international trade and finance.—II. (II.)

203A. Data Analysis for Managers (3)
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Introduction to statistics and data analysis for managerial decision making. Descriptive statistics, principles of data collection, sampling, quality control, statistical inference. Application of data analytic methods to problems in marketing, finance, accounting, production, operations, and public policy.—II. (II.) Tsai

203B. Forecasting and Managerial Research Methods (3)
Lecture—3 hours. Prerequisite: course 203A. Practical statistical methods for managerial decision making covers regression analysis, time series analysis and forecasting, design and analysis of experiments in managerial research and contingency table analysis. Application of these methods to marketing, finance, accounting, production, operations, and public policy.—II. (II.) Tsai

204. Marketing Management (3)
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management. Analysis of market opportunities, elements of market research, development of marketing strategies, market planning and implementations, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, and sales.—III. (III.)

205. Financial Theory and Policy (3)
Lecture—3 hours. Prerequisite: graduate student in the Bay Area MBA Program. Corporate financial policy and investment management. Covers capital budgeting, optimal financial structure, cost-of-capital determination, risk measurement. Develops basic valuation principles for investments with long-lived and risky cash-flows, and extends these to derivative securities, asset portfolios, investment management and hedging.—III. (III.) Barber

206. Decision Making and Management Science (3)
Lecture—3 hours. Prerequisite: graduate student in the Graduate School of Management MBA program or consent of instructor. Develops decision-making and problem-solving skills in conjunction with a quantitative model-building approach. Emphasizes how structured modeling techniques, probability forecasts, simulations, and computer optimization models are used in the overall process of making decisions in an uncertain environment.—II. (II.)

207. Management Information Systems (3)
Lecture—3 hours. Prerequisite: graduate student or consent of instructor. Introduction to computer programming and data handling skills. Use of computer in organizations, emphasis on managerial aspects of computing. Standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security.—I, II, III. (I, II, III.) Bhargava, Woodruff

207A. Advanced Legal Research (2)
Seminar—2 hours. Will introduce students to advanced legal research tools and techniques used in practice, including efficient computer research techniques. Limited enrollment.

210T. Policing Seminar (2)
Seminar—2 hours. What are the expectations and roles of the police in a democratic society? We need order maintenance and crime control, but to assume these tasks the police sometimes intrude upon interests considered fundamental to free societies. Limited enrollment.

Elective Courses

Students must complete the Management core course requirement before enrolling in any of the following courses, or petition with consent of the instructor.

215. Business Law (3)
Lecture—3 hours. Prerequisite: completion of Administration core requirements or petition with consent of instructor. Introduction to law and legal process in the United States. Sources of law. Structure and operation of courts, federal-state relationships, fundamentals of administrative law, fundamentals of business law. IV. (IV.)

216. Managing Professionals, Budgets, Controls and Ethics (3)
Lecture—3 hours. Prerequisite: graduate standing. Performance measures, budgetary controls and ethical pressures which occur at middle management levels in service-type operations. Addresses such organizations as engineering, medical groups, law offices, management consultants.—I. (I.) Suran

218T. Selected Topics in Constitutional Law (2)
Seminar—2 hours. Examines two core themes of Constitutional Law I and Federal Jurisdiction: federalism and separation of powers. Concentrates on habeas corpus and the Eleventh Amendment as vehicles for examining the constitutional themes in greater depth.

219. Evidence (4)
Discussion—4 hours. Covers rules regarding the admissibility of testimonial and documentary proof during trial of civil and criminal cases, including rules governing relevancy, hearsay, the examination and impeachment of witnesses, expert opinion, and constitutional and statutory privileges.

220. Management of Social Networks (3)
Lecture/discussion—3 hours. Prerequisite: course 201A; open to MBA students only. Principles and applications of social network theory: coordinating divergent interests to create value for individuals and organizations. Emphasis on conceptual models, web-based diagnostic tools, and practical applications. Offered in alternate years.—(I.)

220T. Tax and Distributive (3)
Discussion—3 hours. Advanced tax course designed to introduce students to issues of tax policy, with particular emphasis on tax distribution (i.e., who or what should pay taxes in society) and tax incidence (i.e., who or what ends up paying taxes in society).

223. Power and Influence in Management (3)
Seminar—3 hours. Prerequisite: consent of instructor. Investigation of the bases of power in organizations and the tactics used to translate power into influence. Topics include the control of resources (includ-

ing information), social psychological processes (including commitment), the construction of meaning, and ethics.—I. (I.) Palmer

224. Managing People in Modern Organizations (3)
Lecture/discussion—3 hours. Modern systems for managing people. Examination of the changing workforce and workplace, emphasizing high-technology and knowledge-intensive organizations. The impact of firms environment (competition, product market, regulations) on choices for managing people. The consequences of these choices for firms and managers. Open to MBA students only.—II. (II.) Bechky

228A. Mergers and Acquisitions Law (3)
Discussion—2 hours. Prerequisite: course 215. Practical approach to mergers and acquisitions, with an in-depth look at the planning, negotiation, documentation and completion of mergers and acquisitions.

228T. Accounting for Lawyers (2)
Discussion—2 hours. Exposes students to basic principles of accounting, from the perspective of the practicing attorney.

236A. Securities Regulation (2)
Discussion—2 hours. Prerequisite: course 215 or consent of instructor. Legal rules and concepts applicable to business associations, both public and closely held. Corporate form of organization, partnerships and other associational forms.

240. Management Policy and Strategy (3)
Lecture—3 hours. Prerequisite: first-year core courses of M.B.A. program. Examines the scope of missions, objectives strategies, policies, structures, measurements and incentives which bear on the management of an organization. Real client organizations, in the private and public sectors, are assigned to student teams as the subjects of study.—I. (I.) Suran

241. New Product Development (3)
Lecture/discussion—3 hours. Prerequisite: course 249 or consent of instructor; restricted to graduate students in the Graduate School of Management. Disseminates state-of-the-art concepts and methods to enhance the effectiveness of new product development activities. Focuses on the understanding of managerial issues and acquiring the ability to solve problems.—III. (III.) Naik

242. Marketing Communications (3)
Lecture—3 hours. Issues in designing a marketing communications strategy. Topics include mass and direct communications, institutional aspects of advertising, consumer behavior, evaluating ad effectiveness, determining ad budget, creative strategy, and use and abuse of promotions.—III. (III.) Naik

244. New and Small Business Ventures (3)
Lecture—3 hours. Emphasizes starting a new business venture or managing a small, ongoing business during its formative stages. The business plan. Legal forms, financial considerations, the management team. The entrepreneur. Students develop a detailed business plan.—IV. (IV.)

245. Corporate and White Collar Crime (2)
Discussion—2 hours. The law of conspiracy, corporate criminal liability, mail and wire fraud, RICO, money laundering, and other business and environmental crimes and associated defenses.

246. Negotiation and Team Building (3)
Lecture—3 hours. Prerequisite: courses 202, 205. Teaches basic theory of negotiation; applies theory to process of building teams to achieve business purposes. Covers integrative and distributive strategies of claiming value, how to recognize bargaining tricks, uncovering hidden agendas, brainstorming to extend Pareto frontier.—II. III. (II, III.) Elsbach

247. Customer Service as a Marketing Tool (3)
Lecture—3 hours. Understanding the distinct features of services, how to create value through service, methods of building strong relationships with customers, methods of measuring and building customer satisfaction, and measuring the financial impact of service improvement.—I. (I.)

247B. Corporate Tax (3)
Discussion/laboratory—3 hours. Examination of the federal income tax relationship between corporations and their owners. The class will cover the transfer of funds into a corporation on formation and the re-transfer of money and property from the corporation to its shareholders.

248. Marketing Strategies (3)
Lecture—3 hours. Examines process by which organizations develop strategic marketing plans. Includes definition of activities and products, marketing audits, appraising market opportunities, design of new activities and products, and organizing marketing planning function. Applications to problems in private and public sector marketing.—I. (I.) Rubel

248B. International Human Rights & Transitional Justice (3)
Discussion—3 hours. Study in international law respecting the protection of individuals from harm, both by the state and, increasingly, by other individuals.

248T. Fundamentals of Public International Law (1)
Seminar—1 hour. Introduces students to the basic principles of international law as well as basic techniques of international legal research. GE Credit: Wrt.

249. Marketing Research (3)
Lecture—3 hours. Course addresses the managerial issues and problems of systematically gathering and analyzing information for making private and public marketing decisions. Covers the cost and value of information, research design, information collection, measuring instruments, data analysis, and marketing research applications.—III. (III.) Bunch

250. Technology Management (3)
Lecture—3 hours. Management of the engineering and technology activity. Functions of design, planning, production, marketing, sales, and maintenance. Technological product life cycle. Research and development activity. Project planning and organization. Manufacturing issues. Case studies.—III. (III.)

251. Management of Innovation (3)
Lecture—3 hours. Managing innovative enterprise in changing and uncertain environments. Covers technology forecasting and assessment, program selection and control, financial management, regulation, and ethics.—I. (I.) Biggert

252. Production and Operations Management (3)
Lecture—3 hours. Explores methods of increasing operational efficiency in production and service organizations through planning and scheduling, materials management, inventory control, quality control, and distribution. Methodologies employed include such techniques as programming, simulation, systems analysis, queuing, and network models.—IV. (IV.) Woodruff

254. Housing Law (2)
Discussion—2 hours. Survey course covers legal and policy issues related to developing, protecting and preserving affordable, safe and accessible housing and sustaining viable, diverse communities.

258A. Legal Ethics and Corporate Practice (3)
Discussion—3 hours. Focus on corporate practice to explore the ethical responsibilities of lawyers.

259. Feminist Legal Theory (3)
Discussion—3 hours. Provides an overview of feminist legal theory and considers how its various strands inform legislative and judicial law making. Satisfies Advanced Writing Requirement.

260. Corporate Finance (3)
Lecture—3 hours. Focuses on planning, acquiring, and managing a company's financial resources. Includes discussion of financial aspects of mergers and other forms of reorganization; analysis of investment, financial, and dividend policy; and theories of optimal capital structure.—III. (III.) Scherbina

261. Investment Analysis (3)
Lecture—3 hours. Examines asset pricing theories and relevant evidence, including the investment performance of stocks and bonds. Topics include the efficiency of markets, domestic and international portfolio diversification, factors influencing the value of stocks and other investments, and portfolio management and performance.—I. (I.) Chen

262. Antitrust (3)
Discussion—3 hours. The principal focus of the course is the federal antitrust laws, concentrating on basic substantive areas of the Sherman and Clayton Acts.

263. Derivative Securities (3)
Lecture/discussion—3 hours. The behavior of options, futures, and other derivative securities markets and how public agencies, business and others use those markets. Trading strategies involving options, swaps, and financial futures contracts. Pricing of derivative securities, primarily by arbitrage methods. Open to students enrolled in the MBA program.—III. Edelen

264. Business Taxation (3)
Lecture—3 hours. Analysis of the impact of business taxation on investment, production, and finance decisions. Discussion of the relationship between business organization and tax liability. Course is not intended for tax specialists.—II. (II.) Yetman

266. International Finance (3)
Lecture—3 hours. Prerequisite: course 207 or the equivalent. Open economy macroeconomics, balance of payments theory, and financial decision making in multinational firms.—II. (II.)

267. Teams and Technology (3)
Lecture/discussion—3 hours. Restricted to working professional MBA students or consent of instructor. Theory and practice of managing teams with primary goals of: providing conceptual guidelines for analyzing and diagnosing group dynamics and determining strategic options as a manager; imparting interpersonal skills for implementing effective strategies; understanding how technological change affects team processes.—III. (III.)

268. Management Communications (3)
Lecture—3 hours. The theories, strategies, and skills necessary for effective communication in management. Students will learn to improve their business writing, and will deliver business presentations orally.—II. (II.) Kennedy

270. Corporate Financial Reporting (3)
Lecture—3 hours. Analyzes and evaluates contemporary issues in financial reporting and develops implications of those issues for business decision makers, investment managers, and accounting policymakers.—IV. (IV.) Griffin

271. Incentives and Controls (3)
Lecture/discussion—3 hours. Prerequisite: course 200B. Concepts and techniques of accounting and budgeting for management decision making in the private sector. Topics include strategy, organizational structure, market-based incentives, performance evaluation and ethical issues.—I. (I.) Maher

271A. NonProfit Organizations: State and Local Governance Issues (2)
Discussion—2 hours. Prerequisite: Prior or concurrent enrollment in course 215, or consent of instructor. Focuses on the state and local laws applicable to nonprofit organizations; i.e., public interest, cultural, religious, educational and other not-for-profit entities.

271B. Nonprofit Organizations: Tax Exemptions and Taxation Focus (2)
Discussion—2 hours. Prerequisite: course 215 or consent of instructor; course 220 recommended. Focuses on the conceptual basis and substantive law criteria for the federal and state income tax exemption of nonprofit organizations.

272. Evaluation of Financial Information (3)
Lecture—3 hours. Studies how investors, creditors, others use accounting and other information in making rational investment, lending decisions. Emphasis is placed on the analysis of financial information in

a variety of contexts. Where applicable, recent research in finance and economics is discussed.—III. (III.) Griffin

273. Accounting and Reporting for Government Nonprofit Entities (3)
Lecture—3 hours. Concepts, methods, and uses of accounting and financial reporting by governmental and nonprofit entities. Introduction to budgeting and performance evaluation, and accounting for entities such as hospitals, universities, and welfare agencies.—III. (III.)

274. Corporate Governance (3)
Lecture—3 hours. Prerequisite: restricted to full-time MBA students or consent of instructor. Discusses how corporations can better operate in the interests of shareholders and public. Directly relevant to managers, consultants in compensation and incentives, staff working on mergers and acquisitions, corporate regulators, shareholder rights activists, and board members. II, III. (II, III.)

274A. International Intellectual Property and Development (3)
Discussion—3 hours. In September 2007 the World Intellectual Property Organization adopted a development agenda that would rewrite that body's mandate, placing the concerns of the poor at the center of international intellectual property law and policy.

276. Real Estate, Finance and Development (3)
Lecture—3 hours. Prerequisite: courses 201A and 207. Focus on single family, attached, detached, multi-family, and light commercial development. Students will study factors which make up successful real estate developments. Course will consider financial aspects involved in land acquisition, land development, construction, and project lending.—II. (II.)

281. Systems Analysis and Design (3)
Lecture—3 hours. Design and specification of computer-based information systems. Applications systems development life cycle, use requirements and feasibility assessment, logical and physical design, program development and testing, conversion and implementation.

284. Applied Linear Models for Management (3)
Lecture—3 hours. Covers regression, analysis of variance, and multivariate analysis. Topics will focus on applications to management and policy problems.—Tsai

285. Time Series Analysis and Forecasting (3)
Lecture—3 hours. Considers application of time series methods to evaluation and forecasting problems. Covers univariate and multivariate ARIMA models and transfer function models. Applications will be in such areas as economics, finance, budgeting, program evaluation, and industrial process control.—Tsai

286. Telecommunications and Computer Networks (3)
Lecture—3 hours. Prerequisite: course 280. Communication system components; common carrier services; design and control of communications networks; network management and distributed environment; local area networks; data security in computer networks.—Topkis

286B. Public Health Law (2)
Discussion—2 hours. Addresses legal issues raised in three general areas: access to health care, health care financing, and quality of care.

287. Database Systems (3)
Lecture—3 hours. Prerequisite: course 280. Hierarchical, network, and relational models for database systems. Design and implementation of models. Performance evaluation and benchmarking. Query structures and languages. Data security and integrity. Application to managerial decision making and decision support systems.—II. (II.) Yang

288. Special Topics in Management of Information Systems (3)
Lecture—3 hours. Managerial aspects of information systems. Topics stressing applications in organizations chosen from: economics of computers and information systems, decision support systems, management of computer-based information systems, office automation.—Topkis

290. Topics in General Management (3)
Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in general management Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of business writing, business communications, development, or workplace processes. May be repeated for credit.—I, II, III. (I, II, III.) Woodruff

291. Topics in Organizational Behavior (3)
Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in social psychology and sociology of organizations. Varied topics to cover more extensively issues discussed in courses 201A and 201B, or current business interest topics in fields of organization design, strategy, development, or workplace processes. May be repeated for credit.—II. (II.) O'Mahony

291A. International Finance (4)
Discussion—4 hours. Money makes the world go round. We will try to follow that money, learning how a framework of national and international laws and institutions regulates (or perhaps fails to regulate) its flow.

292. Topics in Finance (3)
Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in finance. Application of modern techniques of finance to business problems. Use of appropriate electronic database and research techniques. May be repeated for credit.—I. (I.)

293. Topics in Marketing (3)
Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Advanced topics in marketing, which may include marketing research, new product development, brand management, pricing, distribution management, service marketing, hitech marketing, advertising, sales promotions, marketing through the Web. May be repeated for credit.—I. (I.)

294. Topics in Accounting (3)
Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Contemporary and emerging issues in financial management accounting. Application of modern techniques of evaluation and analysis of financial information. Use of appropriate electronic database and research techniques. May be repeated for credit.—I. (I.)

295. Topics in Information Technology (3)
Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Applications of information technology to management and management of information technology. Adaptation to the dynamic nature of the field. May be repeated for credit.—I. (I.)

296. Topics in Technology Management (3)
Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. Cyclical nature of innovation and technological change, features of innovative firms and industries, national innovation systems, and impact of information technologies on innovation processes. May be repeated for credit.—III. (III.) Bhargava

297. Topics in International Management (3)
Seminar—3 hours. Prerequisite: completion of all first-year graduate courses at the Graduate School of Management or the equivalent. The broader environment in which U.S. firms and their foreign competitors operate. Integration of material from other topics courses (marketing, strategy, finance, accounting, information technology, technology management) into the international setting. May be repeated for credit.—I. (I.)

298. Directed Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

299. Individual Study (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

498. Directed Group Study Management Practicum (3)
Project—3 hours. Prerequisite: consent of instructor; sponsorship of a GSM Academic Senate faculty member, and approval of Graduate Advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other GSM courses. (S/U grading only.)—I, II, III. (I, II, III.)

499. Directed Individual Study Management Practicum (3)
Project—3 hours. Prerequisite: consent of instructor; sponsorship of a Graduate School of Management Academic Senate faculty member and approval of graduate advisor. Provides the opportunity for students to gain experience in applying business methodologies previously acquired in other Graduate School of Management courses. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Managerial Economics

(College of Agricultural and Environmental Sciences)

The Major Program

The Managerial Economics major at UC Davis is a disciplinary program combining strong preparation in microeconomic theory and quantitative methods. It prepares students for the analysis of management and policy issues in business, finance, production, agriculture, food distribution, natural resources, the environment, resource allocation, and markets in developed and developing economies. Students specialize in one of three options: *(1)* Managerial Economics focuses on the economic aspects of managerial decision-making. *(2)* Environmental and Resource Economics concentrates on issues related to the use of resources and environmental quality. *(3)* Agricultural Economics focuses on the economic and policy aspects of production and marketing of foods and fibers. Students in the Managerial Economics program develop valuable skills and strengths that lead to promising careers in business.

Internships and Career Alternatives. Students in managerial economics have opportunities to gain additional career information and preparation through internships in a variety of private business and governmental agencies. Graduates qualify for supervisory and management training positions in banking, finance, commodity and stock brokerages in the private sector, farm and ranch production, food and agricultural processing, agricultural sales and service, and a variety of agency career positions in local, state, and federal government. Students who desire additional training are well qualified to enter graduate programs in agricultural and resource economics, economics, business administration, or law. For more information, see *http://icc.ucdavis.edu*.

Major Entrance Requirements. Students may enter the Pre-Managerial Economics major while completing the major preparatory requirements.

Acceptance into the pre-major does not guarantee automatic admission into the major. Before declaring a major in Managerial Economics, a student must complete the following courses with a combined grade point average (GPA) of at least 2.800. All of

these courses must be taken for a letter grade. Check with an adviser about AP scores in these courses. In determining admission to major status, the Department of Agricultural and Resource Economics counts only the first repeat of any pre-major course.

Economics 1A and 1B ..... 8 units
Statistics 13 ..... 4 units
Mathematics 16A and 16B
or 21A and 21B ..... 6-8 units

If a student has taken Agricultural and Resource Economics (ARE) 100A and/or Economics (ECN) 101 before applying for admission to our major, ARE 100A will take the place of ECN 1A and ECN 101 will take the place of ECN 1B for calculation of the student's entrance GPA.

B.S. Major Requirements:

UNITS

English Composition Requirement 4

In addition to the College English Composition requirement, choose one from English 3, University Writing Program 1, 18, 19, 101, 102A-G, 104A-F

Preparatory Subject Matter..... 35-37

Management 11A-11B 8
Plant Sciences 21, Engineering Computer Science 10, 15 or 30 3-4
Economics 1A-1B 8
Mathematics 16A-16B-16C or 21A-21B 8-9
Statistics 13, 103 8

Major Breadth 37

Social Science, Natural Science, and Agricultural Science
*See major breadth requirement checklist at *http://www.agecon.ucdavis.edu* for a complete list of course subjects.

Total Depth Subject Matter 52

Core 20

Agricultural and Resource Economics 100A, 100B, 106, 155..... 16
Economics 101 4

Restricted Electives..... 32

Choose at least one of the options below:

Managerial Economics option

Agricultural and Resource Economics 18..... 4
Choose at least 12 units from Agricultural and Resource Economics 112, 118, 136, 157, 171A, 171B. Select the remaining 16 units from the aforementioned courses or from Agricultural and Resource Economics 115A, 120, 121, 130, 132, 138, 139, 140, 143, 144, 145, 146, 150, 156, 175, 176, 194HA-194HB, Economics 115A, 121A, 121B, 151A, 151B, 160A, 160B

Environmental and Resource Economics option

Agricultural and Resource Economics 175, 176..... 8
Choose at least 18 units from Agricultural and Resource Economics 15, 120, 138, 145, 146, 150, 156, Economics 123, 125, 130, Environmental Science and Policy 168A, 168B, 178. Select the remaining 6 units from the aforementioned courses or upper division courses in Agricultural and Resource Economics and/or Economics, Environmental Science and Policy 160, 161, 163, 165, 166, 167, 171, 172, 173, Environmental Toxicology 138

Agricultural Economics option

Choose at least 15 units from Agricultural and Resource Economics 120, 130, 132, 138, 139, 140, 145, 150. Select the remaining 17 units from the aforementioned courses, Agricultural and Resource Economics 18, or upper division courses in Agricultural and Resource Economics and/or Economics

*Students graduating with this major are required to attain at least a C average (2.000) in all upper division courses taken at the University in the depth subject matter. All core and restricted electives must be taken for a letter grade.

Total Units for the Major 128-130

Student Advising for the major is in 1176-A Social Sciences and Humanities Building (530) 754-9536.

Major Advisers. Contact Department office

Minor Program Requirements:

Before declaring a minor in Managerial Economics, a student must complete the following courses with a combined grade point average (GPA) of at least 2.800. All of these courses must be taken for a letter grade. In determining admission to minor status, the Department of Agricultural and Resource Economics counts only the first repeat of any pre-minor course.

Economics 1A and 1B ..... 8 units
Mathematics 16A-16B or
21A-21B..... 6-8 units
Statistics 13..... 4 units

The Department of Agricultural and Resource Economics offers four minor emphases open to students majoring in other disciplines who wish to complement their study programs with a minor in Managerial Economics. Each emphasis requires Agricultural and Resource Economics 100A, which has prerequisites of Economics 1A-1B and Mathematics 16A-16B. For some courses, Statistics 13 and 103 may be required. Variable-unit courses and lower division courses are not accepted for any emphasis.

UNITS

Managerial Economics 18

General emphasis

Agricultural and Resource Economics 100A or the equivalent..... 4
Additional upper division courses in Agricultural and Resource Economics 14

Agricultural Economics emphasis

Agricultural and Resource Economics 100A or the equivalent..... 4
Additional upper division courses in Agricultural and Resource Economics 14
Select 9 or more units from Agricultural and Resource Economics 120, 130, 132, 138, 139, 140, 145, 150.
Select additional upper division Agricultural and Resource Economics courses to complete the 18-unit total for the minor.

Environmental and Natural Resource Economics emphasis

Agricultural and Resource Economics 100A or the equivalent..... 4
Additional upper division courses in Agricultural and Resource Economics 14
Select 9 or more units from Agricultural and Resource Economics 175 and 176, and either 100B or 120.
Select additional upper division Agricultural and Resource Economics courses to complete the 18-unit total for the minor.

Managerial Economics emphasis

Agricultural and Resource Economics 100A or the equivalent..... 4
Additional upper division courses in Agricultural and Resource Economics 14
Select 9 or more units from Agricultural and Resource Economics 112, 118, 136, 157, 171A, 171B.
Select additional upper division Agricultural and Resource Economics courses to complete the 18-unit total for the minor.

Graduate Study. See Graduate Studies, on page 109.

Master of Education (M.Ed.) (A Graduate Group)

The Master of Education (M.Ed.) program is no longer admitting students; admissions are suspended.

Maternal and Child Nutrition (Department of Nutrition)

Charles E. Hess, Ph.D., Chairperson of the Department

Department Office. 3135 Meyer Hall
(530) 752-4630;
http:// www.extension.ucdavis.edu/macnutrition

Faculty

Faculty members are listed on the website.

Graduate Study. The Nutrition Department offers the degree of M.A.S. in Maternal and Child Nutrition. This program consists of three required six-unit core courses (Nutrition During Pregnancy, Lactation and Infant Nutrition, and Child and Adolescent Nutrition), six to eight units of special topics seminars, two units of electives, and a six-unit student project (produced in consultation with a three-member guidance committee) for a total of 36 units. Each of the core courses will comprise 10 weeks of in-class instruction twice per week for two-and-a-half hours per meeting. Classes will also include online discussion of related material and readings.

Each student will be assigned a three-member guidance committee consisting of two members of the teaching faculty and an additional qualified faculty member to advise the student in choosing an elective and identifying a student project.

Preparation. Admission to the program requires a bachelor's degree with prior course work that includes (or is comparable to): one year of general chemistry, two quarters of organic chemistry, a course in statistics, one course in general physiology, and two quarters of the biochemistry of nutrition.

Graduate Advisors. Kathryn G. Dewey, Ph.D., Professor *(Nutrition)*, Jane Heinig, Ph.D., Academic Administrator *(Nutrition)*

Courses in Maternal and Child Nutrition. See courses under Nutrition, on page 440.

Mathematical and Physical Sciences

(College of Letters and Science)

Louise H. Kellogg, Ph.D., Program Director

Program Office. 118 Everson Hall

Committee in Charge

Andreas J. Albrecht, Ph.D. (*Physics)*
Susan Kauzlarich, Ph.D. *(Chemistry)*
Carlito Lebrilla, Ph.D. *(Chemistry)*
Isabel P. Montañez, Ph.D. *(Geology)*
Bruno L. Nachtergaele, Ph.D. *(Mathematics)*
Warren Pickett, Ph.D. (*Physics)*
Wolfgang Polonik, Ph.D. *(Statistics)*
Francisco J. Samaniego, Ph.D. *(Statistics)*
Peter Schiffman, Ph.D. *(Geology)*
Abigail Thompson, Ph.D. *(Mathematics)*
Academic Senate Distinguished Teaching Award

The Program of Study

The Division of Mathematical and Physical Sciences teaches students to use experimental studies and theoretical analyses to find solutions to real world problems. Students learn to address issues such as cleaning up the environment, preserving natural resources and creating innovative materials for the future. From the study of atoms to the examination of distant galaxies, from abstract number theory to the development of new chemical compounds, the division provides students with the skills to build the world of tomorrow.

The program in Mathematical and Physical Sciences provides an organizational structure within the College of Letters and Science for facilitating the development of innovative curricular initiatives across the mathematical and physical sciences, including offering broadly conceived, integrative undergraduate- and graduate-level courses. The program also may house resident faculty pursuing interdepartmental research and teaching in this area of inquiry.

Courses in Mathematical and Physical Sciences (MPS)

Lower Division Courses

1. General Science: Science in the News (4)
Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: lower division standing. Basic principles in science including numeracy, scale, energy, and time; the scientific method; good and bad science. Emphasis on science topics recently in the news. GE credit: SciEng.—III.

11A-11B. Mathematical and Physical Sciences Seminar (2–2)
Lecture—2 hours. Prerequisite: mentorship for undergraduate research participants in the physical and mathematical sciences. Research and writing in the mathematical and physical sciences. Presentations by various science faculty members.—I-II. (I-II.)

Mathematics

See Mathematics; and Applied Mathematics (A Graduate Group), on page 162.

Mathematics

(College of Letters and Science)

Bruno Nachtergaele, Ph.D., Chairperson

Department Office. 1130 Mathematical Sciences Bldg.
(530) 752-0827;
studentservices@math.ucdavis.edu;
http://www.math.ucdavis.edu

Faculty

Eric Babson, Ph.D. Professor
Zhaojun Bai, Ph.D., Professor *(Computer Science)*
Craig Benham, Ph.D., Professor
Joseph Biello, Ph.D., Associate Professor
James Bremer, Ph.D., Assistant Professor
Angela Y. Cheer, Ph.D., Professor
Jesus De Loera, Ph.D., Professor
C. Albert Fannjiang, Ph.D., Professor
Roland Freund, Ph.D., Professor
Dmitry B. Fuchs, Ph.D., Professor
Janko Gravner, Ph.D., Professor
Robert Guy, Ph.D., Assistant Professor
Joel Hass, Ph.D., Professor
John K. Hunter, Ph.D., Professor
Michael Kapovich, Ph.D., Professor
Matthias Koeppe, Ph.D., Assistant Professor
Gregory J. Kuperberg, Ph.D., Professor
Timothy Lewis, Ph.D., Associate Professor
Fu Liu, Ph.D., Assistant Professor
E. O. Milton, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Alexander I. Mogilner, Ph.D., Professor
Ben Morris, Ph.D., Professor
Motohico Mulase, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Bruno L. Nachtergaele, Ph.D., Professor
Brian Osserman, Ph.D., Associate Professor
Alessandro Pizzo, Ph.D., Assistant Professor
E. Gerry Puckett, Ph.D., Professor
Dan Romik, Ph.D., Assistant Professor
Naoki Saito, Ph.D., Professor
Anne Schilling, Ph.D., Professor
Jennifer Schultens, Ph.D., Professor
Albert Schwarz, Ph.D., Professor
Steve Shkoller, Ph.D., Professor
Alexander Soshnikov, Ph.D., Professor
Thomas Strohmer, Ph.D., Professor
J. Blake Temple, Ph.D., Professor
Becca Thomases, Ph.D., Assistant Professor
Abigail Thompson, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Craig A. Tracy, Ph.D., Professor
Monica Vazirani, Ph.D., Associate Professor
Andrew Waldron, Ph.D., Professor
Qinglan Xia, Ph.D., Assistant Professor
Hong Xiao, Ph.D., Assistant Professor

Emeriti Faculty

David Barnette, Ph.D., Professor Emeritus
Donald C. Benson, Ph.D., Professor Emeritus
Carlos R. Borges, Ph.D., Professor Emeritus
Robert J. Buck, Professor Emeritus
Gulbank D. Chakerian, Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Doyle O. Cutler, Ph.D., Professor Emeritus
James R. Diederich, Ph.D., Professor Emeritus
Allan L. Edelson, Ph.D., Professor Emeritus
Robert D. Glauz, Ph.D., Professor Emeritus
Shirley A. Goldman, M.S., Lecturer Emerita
Charles A. Hayes, Jr., Ph.D., Professor Emeritus
Kurt Kreith, Ph.D., Professor Emeritus
Arthur J. Krener, Ph.D., Professor
Melven R. Krom, Ph.D., Professor Emeritus
Gary J. Kurowski, Ph.D., Professor Emeritus
David G. Mead, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Donald A. Norton, Ph.D., Professor Emeritus
Washek F. Pfeffer, Ph.D., Professor Emeritus
G. Thomas Sallee, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Sherman K. Stein, Litt.D. (hon.), Ph.D., Professor Emeritus, *Academic Senate Distinguished Teaching Award*
Robert W. Stringall, Ph.D., Professor Emeritus
Howard J. Weiner, Ph.D., Professor Emeritus
Roger Wets, Ph.D. Professor Emeritus

Affiliated Faculty

John Chuchel, Ph.D., Lecturer
Ali Dad-del, Ph.D., Lecturer
Duane Kouba, Ph.D., Lecturer
Lawrence Marx, Ph.D., Lecturer

The Major Programs

Mathematics is the study of abstract structures, space, change, and the interrelations of these concepts. It also is the language of the exact sciences.

The Program. Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. After completing basic introductory courses such as calculus and linear algebra, students plan an upper division program in consultation with a faculty adviser. The upper division course offering is grouped into entry level, core, and enrichment courses. Entry level courses are designed to serve as a bridge between the concrete mathematics of the lower division and the more abstract concepts taught in upper division courses. The core classes are intended to provide basic mathematical techniques, whereas the enrichment choices allow students to further mathematical knowledge and skills that feature their research or career interests. This individualized program can lead to graduate study in pure or applied mathematics, elementary or secondary level teaching, or to other professional goals. It can also reflect a special interest such as computational and applied mathematics, computer science, or statistics, or may be combined with a major in some other field.

Career Alternatives. A degree in mathematics provides entry to many careers in addition to teaching. For instance, operations research, systems analysis, computing, actuarial work, insurance, and financial services are only a few such careers. Mathematics is also a sound basis for graduate work in a variety of fields, such as law, engineering, and economics.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**43-46**
Mathematics 12 (or high school equivalent)	0-3
Mathematics 21A, 21B, 21C, 21D, 22B	19
Mathematics 25, 67	8
Computer Science Engineering 30 or Engineering 6	4
Additional non-Mathematics courses chosen from natural sciences	12
Depth Subject Matter	**34-38**
A. Entry Level (Optional) (Suggested choices: one course from Mathematics 108, 114, 115A, 141, 145)	0-4
B. Core	16
Mathematics 125AB	8
Mathematics 135A	4
Mathematics 150A	4
C. Choose one Plan from the following two: (up to 4 of these 18 units may be approved upper division courses outside of the Department of Mathematics with extensive use of mathematics)	18
Plan 1: General Mathematics	
Additional upper division mathematics units selected in consultation with and subject to approval of an adviser	18
Plan 2: Secondary Teaching	
Mathematics 111	4
Mathematics 115A	4
Mathematics 141	4
Additional upper division mathematics units selected in consultation with and subject to approval of an adviser	6
Note: Students who wish to satisfy the single subject matter waiver for the teaching credential should see an adviser as early as possible.	
Total Units for the Major	**77-84**

Applied Mathematics

B.S. Major Requirements:

	UNITS
Preparatory Subject Matter	**42-48**
Mathematics 12 (or high school equivalent)	0-3
Mathematics 21A, 21B, 21C, 21D, 22B	19
Mathematics 25, 67	8
Computer Science Engineering 30, 40	8
One two-quarter sequence from Physics 9A-9B; Biological Sciences 1A-1B; Chemistry 2A-2B; Economics 1A-1B; Statistics 32, 102; or other applied preparatory courses approved by your adviser	7-10
Depth Subject Matter	**48-52**
A. Entry Level (Optional) (Suggested choices: one course from Mathematics 108, 114, 115A, 141, 145)	0-4
B. Core	32
Mathematics 150A	4
Mathematics 135A	4
Mathematics 125AB	8
Mathematics 119A	4
Mathematics 128AB	8
Mathematics 185A	4

C. Enrichment 16
1. Choice of two courses from Mathematics 118ABC, 119B, 124, 128C, 129, 133, 167, 168 8
2. Choice of one course from Mathematics 111, 114, 115A, 116, 135B, 141, 145, 146, 147, 148, 150B, 165, 185B 4
3. One approved upper division course outside the Department of Mathematics with extensive use of mathematics 4

Total Units for the Major 90-100

Mathematics

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 34-38

Mathematics 12 (or high school equivalent) 0-3
Mathematics 21A, 21B, 21C, 21D, 22B 19
Mathematics 25, 67 8
Computer Science Engineering 30 or Engineering 6 4
Physics 9A (Plans 1 and 2) or one course from Physics 7A, Statistics 13, 32, 100 or 102 (Plan 2) 3-4

Depth Subject Matter 48-52

Choose one plan from the following two:

Plan 1: General Mathematics

A. Entry Level (Optional) 0-4
(Suggested choices: one course from Mathematics 108, 114, 115A, 141, 145)
B. Core 28
Mathematics 150ABC 12
Mathematics 135A 4
Mathematics 125AB 8
Mathematics 185A 4
C. Enrichment 20
1. Choice of four courses from Mathematics 111, 114, 115AB, 116, 135B, 141, 145, 146, 147, 148, 165, 185B 16
2. Choice of one course from Mathematics 119A, 124, 128A, 128B, 129, 133, 167, 168 or one approved upper division course outside the Department of Mathematics with extensive use of mathematics 4

Plan 2: Mathematics for Secondary Teaching

A. Entry Level (Optional) 0-4
(Suggested choices: one course from Mathematics 108, 114, 145)
B. Core 28
Mathematics 150A 4
Mathematics 135A 4
Mathematics 125AB 8
Mathematics 111 4
Mathematics 115A 4
Mathematics 141 4
C. Enrichment 20
1. Choice of four courses from Mathematics 114, 116, 118A, 119AB, 128A, 129, 133, 135B, 145, 147, 148, 165, 167, 168, 185AB. Up to four units can be approved upper division units outside the Department of Mathematics with extensive use of mathematics 16
2. Choice of one course from Mathematics 115B, 146, 150B 4

Total Units for the Major 82-90

Mathematical and Scientific Computation

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 35-38

Mathematics 12 (or high school equivalent) 0-3
Mathematics 21ABC or Mathematics 17ABC, 21D, 22B 19
Mathematics 25, 67 8
Computer Science Engineering 30, 40 8

Depth Subject Matter 48-52

A. Entry Level (Optional) 0-4
(Suggested choices: one course from Mathematics 108, 114, 115A, 141, 145)
B. Core 28
Mathematics 150A 4
Mathematics 135A 4
Mathematics 125AB 8
Mathematics 128ABC 12
C. Enrichment 12
1. Choice of two courses from Mathematics 118ABC, 119AB, 129, 133, 167, 185A 8
2. Choice of one course from Mathematics 111, 114, 115A, 116, 135B, 141, 145, 146, 147, 148, 150B, 165 4
D. Choose one Emphasis from the following two 8

Computational and Mathematical Biology Emphasis

Mathematics 124 4
One approved upper division course in Biology 4

Computational and Mathematics Emphasis

Mathematics 168 4
One approved upper division course involving extensive computation or theory of computation 4

Total Units for the Major 83-90

Recommended Language Preparation. Bachelor of Science degree candidates are advised, but not required, to satisfy the same language requirement as that for a Bachelor of Arts degree candidate, and to fulfill it in French, German, or Russian.

Major Advisers. For a current list of faculty advisers, contact the Student Services office at *studentservices@math.ucdavis.edu*, or our see website.

Depth Subject Matter Requirements. Certain mathematically oriented courses given by other departments are admissible in partial satisfaction of the depth subject matter requirements with prior departmental approval. Up to three units of Math 194 may be counted toward the depth subject matter requirements. Additionally, up to three units of Math 189, Math 198, and Math 199, can be counted.

Statement of Objectives. As early as possible, but no later than the last quarter of the sophomore year or no later than the beginning of the first quarter of the junior year for transfer students, each prospective mathematics major, in consultation with a faculty adviser, should file a formal program of study in one of the majors offered in mathematics. Forms to be used for this are available on our website or from the Department office. Failure to file a formal program could lead to a delay in graduation.

Information for Undergraduates. Assistance in planning an undergraduate major program in mathematics is available on our website, as well as by consulting a faculty adviser.

Mathematics Placement Requirement. Students who wish to enroll in Mathematics 12, 16A, 17A, 21A, 21AH, and 36 must satisfy the mathematics placement requirement. See the Department of Mathematics' website for details well in advance of enrolling. Students who do not satisfy the requirement will be administratively dropped from these courses. The Learning Skills Center provides review materials, review workshops, and other recommended remedial math courses.

Honors and Honors Program. Students who have completed at least 135 units with a minimum GPA of 3.500 in courses counted towards their major are automatically admitted to the Honors Program. Students who are eligible will be notified of their standing by the department at the beginning of the Fall quarter of their senior year.

Students in the Honors Program who meet the minimum GPA requirement and who complete a senior project in consultation with their faculty adviser may also be recommended by the department for graduation with High Honors or Highest Honors. Recommendations will be based on evaluations of students' academic achievements in their major and the quality of their senior project. For complete details, see our website at *http://www.math.ucdavis.edu*.

Minor Program Requirements:

UNITS

Mathematics 20

Upper division units in mathematics (exclusive of Mathematics 192, 197TC, 198, 199) 20

Teaching Credential Subject Representative. Ali Dad-del

Graduate Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in Mathematics. Information regarding graduate study may be obtained by consulting our website, and by sending an e-mail to *studentservices@math.ucdavis.edu*.

Courses in Mathematics (MAT)

Lower Division Courses

B. Elementary Algebra (no credit)
Lecture—3 hours. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of $45.)—I. (I.)

C. Trigonometry (no credit)
Lecture—2 hours. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of $30.)—I. (I.)

D. Intermediate Algebra (no credit)
Lecture—3 hours. Basic concepts of algebra, prepares student for college work in mathematics, such as course 16A or 21A. Functions, equations, graphs, logarithms, and systems of equations. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of $15.)—I, II. (I, II.)

12. Precalculus (3)
Lecture—3 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry; and obtaining required score on the Precalculus Diagnostic Examination. Topics selected for their use in calculus, including functions and their graphs, slope, zeroes of polynomials, exponential, logarithmic and trigonometric functions, sketching surfaces and solids. Not open for credit to students who have completed any of courses 16A, 16B, 16C, 17A, 17B, 17C, 21A, 21B, or 21C with a C- or better.—I, II, III. (I, II, III.)

Note: Mathematics 16A, 16B, and 16C are intended for students who will take no more Mathematics courses. Mathematics 17A, 17B, and 17C have the same level of rigor as 16A, 16B, and 16C, yet are much more broad mathematically (containing algebra, differential equations and probability, besides traditional calculus), and are intended for biology students who do not wish to take more rigorous Mathematics courses.

16A. Short Calculus (3)
Lecture—3 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and satisfying the Mathematics Placement Requirement. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open for credit to students who have received credit for Mathematics 17B, 17C, 21A, 21B, or 21C. Only 2 units of credit to students who have completed course 17A. GE credit: SciEng.—I, II, III. (I, II, III.)

16B. Short Calculus (3)
Lecture—3 hours. Prerequisite: course 16A, 17A, or 21A. Integration; calculus for trigonometric, exponential, and logarithmic functions; applications. Not open for credit to students who have completed courses 17C, 21B, or 21C. Only 2 units of credit to students who have completed course 17B. GE credit: SciEng.—I, II, III. (I, II, III.)

16C. Short Calculus (3)
Lecture—3 hours. Prerequisite: course 16B, 17B, or 21B. Differential equations; partial derivatives; double integrals; applications; series. Not open for credit to students who have completed course 21C. Only two units of credit to students who have completed course 17C. GE credit: SciEng.—I, II, III. (I, II, III.)

Note: Mathematics 16A, 16B, and 16C are intended for students who will take no more Mathematics courses. Mathematics 17A, 17B, and 17C have the same level of rigor as 16A, 16B, and 16C, yet are much more broad mathematically (containing algebra, differential equations and probability, besides traditional calculus), and are intended for biology students who do not wish to take more rigorous Mathematics courses.

17A. Calculus for Biology and Medicine (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytical geometry, and satisfying the Mathematics Placement Requirement. Introduction to differential calculus via applications in biology and medicine. Limits, derivatives of polynomials, trigonometric, and exponential functions, graphing, applications of the derivative to biology and medicine. Not open for credit to students who have completed course 16B, 16C, 21A, 21B, or 21C. Only 2 units of credit to students who have completed course 16A. GE credit: SciEng.—I, II, III. (I, II, III.)

17B. Calculus for Biology and Medicine (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 16A, 17A, or 21A. Introduction to integral calculus and elementary differential equations via applications to biology and medicine. Fundamental theorem of calculus, techniques of integration including integral tables and numerical methods, improper integrals, elementary first order differential equations, applications in biology and medicine. Not open for credit to students who have completed course 16C, 21B, or 21C. Only 2 units of credit for students who have completed course 16B. GE credit: SciEng.—I, II, III. (I, II, III.)

17C. Calculus for Biology and Medicine (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 16B, 17B, or 21B. Matrix algebra, functions of several variables, partial derivatives, systems of differential equations, and applications to biology and medicine. Not open for credit to students who have completed course 21C. Only 2 units of credit to students who have completed course 16C. GE credit: SciEng.—I, II, III. (I, II, III.)

21A. Calculus (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry, and satisfying the Mathematics Placement Requirement. Functions, limits, continuity. Slope and derivative. Differentiation of algebraic and transcendental functions. Applications to motion, natural growth, graphing, extrema of a function. Differentials. L'Hopital's rule. Not open for credit to students who have completed course 16B, 16C, 17B, or 17C. Only 2 units of credit to students who have completed course 16A or 17A. GE credit: SciEng.—I, II, III. (I, II, III.)

21AH. Honors Calculus (4)
Lecture/discussion—4 hours. Prerequisite: a Precalculus Diagnostic Examination score significantly higher than the minimum for course 21A is required. More intensive treatment of material covered in course 21A. Offered irregularly. GE credit: SciEng.

21AL. Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite: concurrent enrollment in course 21A. Functions, limits, continuity. Slope and derivative. Same course content as course 21A. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. Offered irregularly. (P/NP grading only.)

21B. Calculus (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 21A or 21AH. Continuation of course 21A. Definition of definite integral, fundamental theorem of calculus, techniques of integration. Application to area, volume, arc length, average of a function, improper integral, surface of revolution. Only 2 units of credit to students who have completed course 16B, 16C, 17B, or 17C. GE credit: SciEng.—I, II, III. (I, II, III.)

21BH. Honors Calculus (4)
Lecture/discussion—4 hours. Prerequisite: a grade of B or better in course 21A or 21AH. More intensive treatment of material covered in course 21B. Students completing 21BH can continue with course 21CH or the regular 21C. Offered irregularly. GE credit: SciEng.

21BL. Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite: course 21A or 21AH; concurrent enrollment in 21B. Continuation of course 21A. Same course content as 21B. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. Offered irregularly. (P/NP grading only.)

21C. Calculus (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 16C, 17C, 21B, or 21BH. Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Vector algebra, vector calculus, scalar and vector fields. Partial derivitives, total differentials. Applications to maximum and minimum problems in two or more variables. Applications to physical systems. GE credit: SciEng.—I, II, III. (I, II, III.)

21CH. Honors Calculus (4)
Lecture/discussion—4 hours. Prerequisite: a grade of B or better in course 21B or 21BH. More intensive treatment of material covered in course 21C. GE credit: SciEng. Offered infrequently.

21CL. Emerging Scholars Program Calculus Workshop (2)
Workshop—6 hours. Prerequisite: course 21B or 21BH; concurrent enrollment in 21C. Continuation of course 21B. Same course content as course 21C. Enrollment for students in the Emerging Scholars Program by instructor's invitation only. (P/NP grading only.) Offered irregularly.

21D. Vector Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C or 21CH. Continuation of course 21C. Definite integrals over plane and solid regions in various coordinate systems. Line and surface integrals. Green's theorem, Stoke's theorem, divergence theorem.—I, II, III. (I, II, III.)

21M. Accelerated Calculus (5)
Lecture/discussion—4 hours; discussion/laboratory—1 hour. Prerequisite: grade of B or higher in both semesters of high school calculus or a score of 4 or higher on the Advanced Placement Calculus AB exam, and obtaining the required score on the Precalculus Diagnostic Examination and its trigonometric component. Accelerated treatment of material from courses 21A and 21B, with detailed presentation of theory, definitions, and proofs, and treatment of computational aspects of calculus at a condensed but sophisticated level. Not open for credit to students who have completed course 21A or 21B; only 3 units of credit will be allowed to students who have completed course 16A and only 2 units of credit will be allowed to students who have completed course 16B. Offered irregularly. GE credit: SciEng.

22A. Linear Algebra (3)
Lecture—3 hours. Prerequisite: nine units of college mathematics and Engineering 6 or knowledge of Matlab or course 22AL (to be taken concurrently). Matrices and linear transformations, determinants, eigenvalues, eigenvectors, diagonalization, factorization. Not open for credit to students who have completed course 67.—I, II, III. (I, II, III.)

22AL. Linear Algebra Computer Laboratory (1)
Laboratory—2-3 hours. Prerequisite: nine units of college mathematics. Introduction to Matlab and its use in linear algebra. (P/NP grading only.)—I, II, III. (I, II, III.)

22B. Differential Equations (3)
Lecture—3 hours. Prerequisite: courses 21C; 22A or 67. Solutions of elementary differential equations.—I, II, III. (I, II, III.)

25. Advanced Calculus (4)
Lecture/discussion—4 hours. Prerequisite: course 21B. Introduction to the rigorous treatment of abstract mathematical analysis. Proofs in mathematics, induction, sets, cardinality; real number system, theory of convergence of sequences. Not open for credit to students who have completed former course 127A.—I, III. (I, III.)

36. Fundamentals of Mathematics (3)
Lecture—3 hours. Prerequisite: satisfaction of the Mathematics Placement Requirement. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorems of arithmetic, properties of the rationals and irrationals, binary and other number systems. Not open for credit to students who have completed course 108. GE credit: SciEng.—IV.

67. Modern Linear Algebra (4)
Lecture/discussion—4 hours. Prerequisite: satisfaction of Math Placement Requirement or course 21A. Rigorous treatment of linear algebra; topics include vector spaces, bases and dimensions, orthogonal projections, eigenvalues and eigenvectors, similarity transformations, singular value decomposition and positive definiteness. Only one unit of credit to students who have completed course 22A.—I, II. (I, II.)

71A-71B. Explorations in Elementary Mathematics (3-3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: two years of high school mathematics. Weekly explorations of mathematical ideas related to the elementary school curriculum will be carried out by cooperative learning groups. Lectures will provide background and synthesize the results of group exploration. (Deferred grading only, pending completion of sequence.) Offered irregularly.

89. Elementary Problem Solving (1)
Lecture—1 hour. Prerequisite: high school mathematics through precalculus. Solve and present solutions to challenging and interesting problems in elementary mathematics. May be repeated one time for credit. (P/NP grading only.) Offered irregularly.

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)—I, II, III. (I, II, III.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)—I, II, III. (I, II, III.)

Upper Division Courses

108. Introduction to Abstract Mathematics (4)
Lecture/discussion—4 hours. Prerequisite: course 21B. A rigorous treatment of mathematical concepts with emphasis on developing the ability to understand abstract mathematical ideas, to read and write mathematical concepts, and to prove theorems. Designed to serve as preparation for the more rigorous upper division courses. GE Credit: Wrt.—I, II. (I, II.)

111. History of Mathematics (4)
Lecture—3 hours; term paper or discussion. Prerequisite: eight units of upper division Mathematics; one of the following: course 25, 67, 108, 114, 115A, 141, or 145. History of mathematics from ancient times through the development of calculus. Mathematics from Arab, Hindu, Chinese and other cultures. Selected topics from the history of modern mathematics.—II. (II.)

114. Convex Geometry (4)
Lecture/discussion—4 hours. Prerequisite: courses 21C; 22A or 67. Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Designed to serve as preparation for the more rigorous upper-division courses. Offered in alternate years.—(II.)

115A. Number Theory (4)
Lecture/discussion—4 hours. Prerequisite: course 21B. Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers. Designed to serve as preparation for the more rigorous upper division courses.—I. (I.)

115B. Number Theory (4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 67, 115A. Euler function, Moebius function, congruences, primitive roots, quadratic reciprocity law. Offered in alternate years.—II.

116. Differential Geometry (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 125A. Vector analysis, curves, and surfaces in three dimensions. Offered in alternate years.—(III.)

118A. Partial Differential Equations: Elementary Methods (4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 21D; 22B; 22A or 67.Derivation of partial differential equations; separation of variables; equilibrium solutions and Laplace's equation; Fourier series; method of characteristics for the one dimensional wave equation. Solution of nonhomogeneous equations.—I. (I.)

118B. Partial Differential Equations: Eigenfunction Expansions (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 118A. Sturm-Liouville Theory; self-adjoint operators; mixed boundary conditions; partial differential equations in two and three dimensions; Eigenvalue problems in circular domains; nonhomogeneous problems and the method of eigenfunction expansions; Poisson's Equations.—II. (II.)

118C. Partial Differential Equations: Green's Functions and Transforms (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 118B. Green's functions for one-dimensional problems and Poisson's equation; Fourier transforms; Green's Functions for time dependent problems; Laplace transform and solution of partial differential equations. Offered irregularly.

119A. Ordinary Differential Equations (4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 21D; 22B; 22A or 67. Scalar and planar autonomous systems; nonlinear systems and linearization; existence and uniqueness of solutions; matrix solution of linear systems; phase plane analysis; stability analysis; bifurcation theory; Liapunov's method; limit cycles; Poincare Bendixon theory.—II. (II.)

119B. Ordinary Differential Equations (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 119A. Lorentz equations; Poincare maps; center manifolds and normal forms; scalar and planar maps; phase space analysis for iterated maps; period-doubling bifurcation; Lyapunov exponent; chaos and symbolic dynamics; strange attractors; fractals.—III. (III.)

124. Mathematical Biology (4)
Lecture—3 hours; project. Prerequisite: courses 22A or 67; 22B. Methods of mathematical modeling of biological systems including difference equations, ordinary differential equations, stochastic and dynamic programming models. Computer simulation methods applied to biological systems. Applications to population growth, cell biology, physiology, evolutionary ecology and protein clustering. MATLAB programming required. Offered in alternate years.—(III.)

125A. Real Analysis (4)
Lecture/discusssion—4 hours. Prerequisite: course 25. Functions, limits of functions, continuity and uniform continuity, sequences of functions, series of real numbers, series of functions, power series. Not open for credit to students who have completed former course 127B.—I, II. (I, II.)

125B. Real Analysis (4)
Lecture/discusssion—4 hours. Prerequisite: course 67 and 125A. Theory of the derivative, Taylor series, integration, partial derivatives, Implicit Function Theorem. Not open for credit to students who have completed former course 127C.—II, III. (II, III.)

128A. Numerical Analysis (4)
Lecture—3 hours; project. Prerequisite: Computer Science: Engineering 30 or equivalent; course 21C; Error analysis, approximation, interpolation, numerical differentiation and integration. Programming in language such as Pascal, Fortran, or BASIC required.—I. (I.)

128B. Numerical Analysis in Solution of Equations (4)
Lecture—3 hours; project. Prerequisite: Computer Science: Engineering 30 or equivalent; courses 21C; 22A or 67. Solution of nonlinear equations and nonlinear systems. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems. Linear programming. Programming in language such as Pascal, Fortran, or BASIC required.—II. (II.)

128C. Numerical Analysis in Differential Equations (4)
Lecture—3 hours; project. Prerequisite: Computer Science: Engineering 30 or equivalent; courses 22A or 67; 22B. Difference equations, operators, numerical solutions of ordinary and partial differential equations. Programming in language such as Pascal, Fortran, or BASIC required.—III. (III.)

129. Fourier Analysis (4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 21D; 22A or 67; 22B; 25 or consent of instructor. Fourier series and integrals, orthogonal sets of functions. Topics selected from trigonometric approximation, orthogonal polynomials, applications to signal and image processing, numerical analysis, and differential equations.—III. (III.)

133. Mathematical Finance (4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 67; 135A. Analysis and evaluation of deterministic and random cash flow streams, yield and pricing of basic financial instruments, interest rate theory, mean-variance portfolio theory, capital asset pricing models, utility functions and general principles. MATLAB programming required. Offered in alternate years.—III.

135A. Probability (4)
Lecture/discussion—4 hours. Prerequisite: course 125A. Probability space; discrete probability, combinatorial analysis; independence, conditional probability; random variables, discrete and continuous distributions, probability mass function, joint and marginal density functions; expectation, moments, variance, Chebyshev inequality; sums of random variables, random walk, large number law, central limit theorem. Not open for credit to students who have completed former course 131.—I, II. (I, II.)

135B. Stochastic Processes (4)
Laboratory/discussion—4 hours. Prerequisite: courses 135A; 22A or 67. Generating functions, branching processes, characteristic function; Markov chains; convergence of random variables, law of iterated logarithm; random processes, Brownian motion, stationary processes, renewal processes, queueing theory, martingales. Not open for credit to students who have completed former course 132A.—III. (III.)

141. Euclidean Geometry (4)
Lecture/discussion—4 hours. Prerequisite: courses 21B; 22A or 67. An axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries. Designed to serve as preparation for the more rigorous upper division courses.—III. (III.)

145. Combinatorics (4)
Lecture/discussion—4 hours. Prerequisite: course 21B. Combinatorial methods using basic graph theory, counting methods, generating functions, and recurrence relations. Designed to serve as preparation for the more rigorous upper division courses.—II. (II.)

146. Algebraic Combinatorics (4)
Lecture/discussion—4 hours. Prerequisite: courses 25; 22A or 67; 145. Enumeration, Polya theory, generating functions, current topics in algebraic combinatorics. Not open for credit to students who have completed former course 149A.—III. (III.)

147. Topology (4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 67, 125A. Basic notions of point-set and combinatorial topology.—III. (III.)

148. Discrete Mathematics (4)
Lecture/discussion—4 hours. Prerequisite: course 67; or courses 22A and 25. Coding theory, error correcting codes, finite fields and the algebraic concepts needed in their development. Not open for credit to students who have completed former course 149B.—II. (II.)

150A. Modern Algebra (4)
Lecture/discussion—4 hours. Prerequisite: course 67. Basic concepts of groups, symmetries of the plane. Emphasis on the techniques used in the proof of the ideas (Lemmas, Theorems, etc.) developing these concepts. Precise thinking, proof writing, and the ability to deal with abstraction.—I. (I.)

150B. Modern Algebra (4)
Lecture/discussion—4 hours. Prerequisite: course 150A. Bilinear forms, rings, factorization, modules.—II. (II.)

150C. Modern Algebra (4)
Lecture/discussion—4 hours. Prerequisite: course 150B. Group representations, fields, Galois theory.—III. (III.)

160. Mathematical Foundations of Database Theory, Design and Performance (4)
Lecture—3 hours; project. Prerequisite: course 22A or 67; one of the following courses: 25, 108, 114, 115A, 141, or 145. Relational model; relational algebra, relational calculus, normal forms, functional and multivalued dependencies. Separability. Cost benefit analysis of physical database design and reorganization. Performance via analytical modeling, simulation, and queueing theory. Block accesses; buffering; operating system contention; CPU intensive operations. Offered irregularly.

165. Mathematics and Computers (4)
Lecture—3 hours; project. Prerequisite: Computer Science Engineering 30 or equivalent; course 22B and one of the following courses: 25, 67, 108, 114, 115A, 141 or 145. Introduction to computational mathematics, symbolic computation, and computer generated/verified proofs in algebra, analysis and geometry. Investigation of rigorous new mathematics developed in conjunction with modern computational questions and the role that computers play in mathematical conjecture and experimentation.—I. (I.)

167. Applied Linear Algebra (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 22A or 67; knowledge of a programming language. Applications of linear algebra; LU and QR matrix factorizations, eigenvalue and singular value matrix decompositions.—I, II, III. (I, II, III.)

168. Optimization (4)
Lecture—3 hours; extensive problem solving. Prerequisite: Computer Science: Engineering 30 or equivalent; courses 21C or 25; 22A or 67. Linear

programming, simplex method. Basic properties of unconstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization. Programming language required.—III. (III.)

180. Special Topics (3)
Lecture—3 hours. Prerequisite: courses 25 and 67, or consent of instructor. Special topics from various fields of modern, pure, and applied mathematics. Some recent topics include Knot Theory, General Relativity, and Fuzzy Sets. May be repeated for credit when topic differs. Not offered every year.
—I, II, III. (I, II, III.)

185A. Complex Analysis (4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 67, 125A. Complex number system, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory.—II. (II.)

185B. Complex Analysis (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 185A. Analytical functions, elementary functions and their mapping properties, applications of Cauchy's integral theorem, conformal mapping and applications to heat flow and fluid mechanics. Offered in alternate years.—III.

189. Advanced Problem Solving (3)
Lecture—3 hours. Prerequisite: courses 21D; 22A or 67; 25. Solution and presentation of advanced problem solving techniques. Solve and present interesting and challenging problems of all areas of mathematics. Not offered every year. GE Credit: Wrt.—II.

192. Internship in Applied Mathematics (1-3)
Internship; final report. Prerequisite: upper division standing; project approval by faculty sponsor prior to enrollment. Supervised work experience in applied mathematics. May be repeated for credit for a total of 10 units. (P/NP grading only.)—I, II, III. (I, II, III.)

194. Undergraduate Thesis (3)
Prerequisite: consent of instructor. Independent research under supervision of a faculty member. Student will submit written report in thesis form. May be repeated with consent of Vice Chairperson. (P/NP grading only.)—I, II, III. (I, II, III.)

197TC. Tutoring Mathematics in the Community (1-5)
Seminar—1-2 hours; laboratory—2-6 hours. Prerequisite: upper division standing and consent of instructor. Special projects in mathematical education developing techniques for mathematics instruction and tutoring on an individual or small group basis. May be repeated one time for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)—I, II, III. (I, II, III.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)—I, II, III. (I, II, III.)

Graduate Courses

200A-200B. Problem-Solving in Analysis (1-1)
Lecture—1 hour; extensive problem solving. Prerequisite: courses 201ABC. Problem-solving in graduate analysis: continuous functions, metric spaces, Banach and Hilbert spaces, bounded linear operators, the spectral theorem, distributions, Fourier series and transforms, Lp spaces, Sobolev spaces. May be repeated two times for credit. (Deferred grading only, pending completion of sequence.)—III, I. (III, I.)

201A-201B-201C. Analysis (4-4-4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing in Mathematics or Applied Mathematics, or consent of instructor. Metric and normed spaces. Continuous functions. Topological, Hilbert, and Banach spaces. Fourier series. Spectrum of bounded and compact linear operators. Linear differential operators and Green's functions. Distributions. Fourier transform. Measure theory. Lp and Sobolev spaces. Differential calculus and variational methods.—I-II-III. (I-II-III.)

202. Functional Analysis (4)
Lecture—3 hours; term paper. Prerequisite: courses 201A and 201B. Hahn-Banach, Open mapping, Closed graph, Banach-Steinhaus, and Krein-Milman. Subspaces and quotient spaces. Projections. Weak and weak-star topologies. Compact and adjoint operators in Banach spaces. Fredholm theory. Functions of operators. Spectral theory of self-adjoint operators. Offered in alternate years.—II.

204. Applied Asymptotic Analysis (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Scaling and non-dimensionalization. Asymptotic expansions. Regular and singular perturbation methods. Applications to algebraic and ordinary and partial differential equations in the natural sciences and engineering. Offered in alternate years.—(I.)

205. Complex Analysis (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 185 or the equivalent, or consent of instructor. Analytic continuation, Riemann surfaces, conformal mappings, Riemann mapping theorem, entire functions, special functions, elliptic functions.—III. (III.)

206. Measure Theory (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 125B. Introduction to measure theory. The study of lengths, surface areas, and volumes in general spaces, as related to integration theory. Offered in alternate years.—III.

207A-207B-207C. Methods of Applied Mathematics (4-4-4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Ordinary differential equations and dynamical systems. Variational principles. Eigenfunctions, integral equations and Green's functions. Complex analysis and contour integration. Laplace's equation. Diffusion equations. Wave phenomena. Dimensional analysis and scaling. Asymptotic expansions and perturbation theory. Stochastic processes and Brownian motion.—I-II-III. (I-II-III.)

215A-215B-215C. Topology (4-4-4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Fundamental group and covering space theory. Homology and cohomology. Manifolds and duality. CW complexes. Fixed point theorems. Offered in alternate years.—(I-II-III.)

216. Geometric Topology (4)
Lecture—3 hours; extensive problem solving—1 hour. Prerequisite: course 215A. Introduction to measure theory. Topology of two- and three-dimensional manifolds. Surfaces and their diffeomorphisms. Dehn twists. Heegaard surfaces. Theory of 3-dimensional manifolds. Knots and knot theory. Hyperbolic manifolds and geometric structures. May be repeated one time for credit. Offered in alternate years.—(II.)

218A-218B-218C. Partial Differential Equations (4-4-4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: 218A—201ABC; 218B—218A; 218C—218B; or consent of the instructor. A yearlong sequence on PDEs which covers linear transport, Laplace, heat, and wave equations, maximum principles, method of characteristics, Sobelev and Hölder space theory, weak derivatives, semilinear, quasilinear, and fully nonlinear elliptic/parabolic equations, nonlinear hyperbolic equations, and compensated compactness. Offered in alternate years.—I-II-III. (I-II-III.)

221A. Mathematical Fluid Dynamics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 118B or consent of instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Offered in alternate years.—(I.)

221B. Mathematical Fluid Dynamics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 118B or consent of instructor. Kinematics and dynamics of fluids. The Euler and Navier-Stokes equations. Vorticity dynamics. Irrotational flow. Low Reynolds number flows and the Stokes equations. High Reynolds number flows and boundary layers. Compressible fluids. Shock waves. Offered irregularly.—(II.)

226A. Numerical Methods: Fundamentals (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 128AB or equivalent, or consent of instructor; familiarity with some programming language. Fundamental principles and methods in numerical analysis, including the concepts of stability of algorithms and conditioning of numerical problems, numerical methods for interpolation and integration, eigenvalue problems, singular value decomposition and its applications. Offered in alternate years.—(I.)

226B. Numerical Methods: Large-Scale Matrix Computations (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 167 or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for large-scale matrix computations, including direct and iterative methods for the solution of linear systems, the computation of eigenvalues and singular values, the solution of least-squares problems, matrix compression, methods for the solution of linear programs. Offered in alternate years.—(II.)

226C. Numerical Methods: Ordinary Differential Equations (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 22B or equivalent, or consent of instructor; familiarity with some programming language. Numerical methods for the solution of ordinary differential equations, including methods for initial-value problems and two-point boundary-value problems, theory of and methods for differential algebraic equations, dimension reduction of large-scale dynamical systems. Offered in alternate years.—(III.)

227. Mathematical Biology (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Nonlinear ordinary and partial differential equations and stochastic processes of cell and molecular biology. Scaling, qualitative, and numerical analysis of mathematical models. Applications to nerve impulse, chemotaxis, muscle contraction, and morphogenesis. Offered in alternate years.—I.

228A-228B-228C. Numerical Solution of Differential Equations (4-4-4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 128C. Numerical solutions of initial-value, eigenvalue and boundary-value problems for ordinary differential equations. Numerical solution of parabolic and hyperbolic partial differential equations. Offered in alternate years.—I-II-III.

235A-235B-235C. Probability Theory (4-4-4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: 235A—courses 125B and 135A or Statistics 131A or consent of instructor; 235B—course 235A/Statistics 235A or consent of instructor; 235C—course 235B/Statistics 235B or consent of instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from martingales, Markov chains, ergodic theory. (Same course as Statistics 235A-235B-235C.)—I-II-III. (I-II-III.)

236A. Stochastic Dynamics and Applications (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 201C or course/Statistics 235B; course/Statistics 235A-235B-235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Offered in alternate years.—I.

236B. Stochastic Dynamics and Applications (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 201C or course/Statistics 235B; course/Statistics 235A-235B-235C recommended. Stochastic processes, Brownian motion, Stochastic integration, martingales, stochastic differential equations. Diffusions, connections with partial differential equations, mathematical finance. Offered irregularly.

239. Differential Topology (4)
Lecture—3 hours; extensive problem solving. Prerequisite: vector calculus, point-set topology, course 201A, or consent of instructor; course 250AB highly recommended. Topics include: differentiable manifolds, vector fields, transversality, Sard's theorem, examples of differentiable manifolds; orientation, intersection theory, index of vector fields; differential forms, integration, Stokes' theorm, deRham cohomology; Morse functions, Morse lemma, index of critical points.—I. (I.)

240A. Differential Geometry (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 201A and 239; 250AB highly recommended; intended primarily for 2nd-year graduate students. Riemannian metrics, connections, geodesics, Gauss lemma, convex neighborhoods, curvature tensor, Ricci and scalar curvature, connections and curvature on vector bundles.—II. (II.)

240B. Differential Geometry (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 240A; intended primarily for 2nd-year graduate students. Jacobi fields, conjugate points, completeness, Hopf-Rinow theorem, Cartan-Hadamard theorem, energy, variation theorems and their applications, Rauch comparison theorem and its applications.—III. (III.)

245. Enumerative Combinatorics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 145, 150 or the equivalent, or consent of instructor. Introduction to modern combinatorics and its applications. Emphasis on enumerative aspects of combinatorial theory. Offered in alternate years.—I.

246. Algebraic Combinatorics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 245 or consent of instructor. Algebraic and geometric aspects of combinatorics. The use of structures such as groups, polytopes, rings, and simplicial complexes to solve combinatorial problems. Offered in alternate years—II.

248A. Algebraic Geometry (4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 250ABC. Affine varieties and radical ideals. Projective varieties. Abstract varieties. Morphisms and rational maps. Smoothness. Algebraic curves and the Riemann-Roch theorem. Special topics. Offered in alternate years.—(I.)

248B. Algebraic Geometry (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 248A. Complex varieties and the analytic topology. Sheaves and schemes. Fiber products. Separatedness and properness. Applications of scheme theory. Offered in alternate years.—(II.)

250A-250B-250C. Algebra (4-4-4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: graduate standing in mathematics or consent of instructor. Group and rings. Sylow theorems, abelian groups, Jordan-Holder theorem. Rings, unique factorization. Algebras, and modules. Fields and vector spaces over fields. Field extensions. Commutative rings. Representation theory and its applications.—I-II-III. (I-II-III.)

258A. Numerical Optimization (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: courses 25, 167. Numerical methods for infinite dimensional optimization problems. Newton and Quasi-Newton methods, linear and sequential quadratic programming, barrier methods; large-scale optimization; theory of approximations; infinite and semi-infinite programming; applications to optimal control, stochastic optimization and distributed systems. Offered in alternate years.—(I.)

258B. Variational Analysis (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: courses 25 and 167, or consent of the instructor. Foundations of optimization theory. The design of solution procedures for optimization problems. Modeling issues, and stability analysis. Offered in alternate years.—(II.)

261A. Lie Groups and Their Representations (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: courses 215A, 240A, 250A-250B or the equivalent or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Offered in alternate years.—(II.)

261B. Lie Groups and Their Representations (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: courses 215A, 240A, 250A-250B or the equivalent or consent of instructor. Lie groups and Lie algebras. Classification of semi-simple Lie groups. Classical and compact Lie groups. Representations of Lie groups and Lie algebras. Root systems, weights, Weil character formula. Kac-Moody and Virasoro algebras. Applications. Offered irregularly.

265. Mathematical Quantum Mechanics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 201 or consent of instructor. Mathematical foundations of quantum mechanics: the Hilbert space and Operator Algebra formulations; the Schrödinger and Heisenberg equations, symmetry in quantum mechanics, basics of spectral theory and perturbation theory. Applications to atoms and molecules. The Dirac equation. Offered in alternate years.—(I.)

266. Mathematical Statistical Mechanics and Quantum Field Theory (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 265 or consent of instructor. Mathematical principles of statistical mechanics and quantum field theory. Topics include classical and quantum lattice systems, variational principles, spontaneous symmetry breaking and phase transitions, second quantization and Fock space, and fundamentals of quantum field theory. May be repeated one time for credit. Offered in alternate years.—(II.)

271. Applied and Computational Harmonic Analysis (4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 125B or 201C; and 128B or 167; and 129 or equivalent, or consent of instructor. Introduction to mathematical basic building blocks (wavelets, local Fourier basis, and their relatives) useful for diverse fields (signal and image processing, numerical analysis, and statistics). Emphasis on the connection between the continuum and the discrete worlds. Offered in alternate years.—(II.)

280. Topics in Pure and Applied Mathematics (3)
Lecture—3 hours. Prerequisite: graduate standing. Special topics in various fields of pure and applied mathematics. Topics selected based on the mutual interests of students and faculty. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

290. Seminar (1-6)
Seminar—1-6 hours. Advanced study in various fields of mathematics, including analysis, applied mathematics, discrete mathematics, geometry, mathematical biology, mathematical physics, optimization, partial differential equations, probability, and topology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)

299. Individual Study (1-12)
(S/U grading only.)—I, II, III. (I, II, III.)

299D. Dissertation Research (1-12)
(S/U grading only.)—I, II, III. (I, II, III.)

Professional Courses

301A-301B-301C. Mathematics Teaching Practicum (3-3-3)
Fieldwork—5 hours; discussion—1 hour. Prerequisite: course 302A-302B-302C and 303A-303B-303C concurrently or consent of instructor. Specialist training in mathematics teaching. Teaching, training, and cross observing classes taught using large group Socratic techniques, small group guided inquiry experiences, and/or other approaches to teaching at various grade levels. Required for advanced degrees in mathematics education. May be repeated one time for credit. Offered irregularly.

302A-302B-302C. Curriculum Development in Mathematics (1-1-1)
Lecture/discussion—1 hour. Prerequisite: course 303A-303B-303C concurrently or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. May be repeated one time for credit. Offered irregularly.

303A-303B-303C. Mathematics Pedagogy (1-1-1)
Lecture/discussion—1 hour. Prerequisite: course 302A-302B-302C or 210L concurrently or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods in view of some of the influences that shaped their development. May be repeated one time for credit. Offered irregularly.

390. Teaching Assistantship Training (3)
Lecture—3 hours. Prerequisite: graduate standing in the Department of Mathematics. Experience in methods of assisting and teaching of mathematics at the university level. Includes discussion of lecturing techniques, running discussion sessions, holding office hours, preparing and grading of examinations, student-teacher interaction, and related topics. Required of departmental teaching assistants. (S/U grading only.)—I. (I.)

399. Individual Study (2-4)
Independent study—2-3 hours; discussion—1 hour. Individual study of some aspect of mathematics education or a focused work on a curriculum design project under supervision of a faculty member in mathematics. May be repeated one time for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Medical Informatics (A Graduate Group)

See Health Informatics (A Graduate Group), on page 325.

Medical Microbiology

See Medicine, School of, on page 380.

Medical Pharmacology and Toxicology

See Medicine, School of, on page 380.

Medicine

See Medicine, School of, on page 380; and Medicine and Epidemiology (VME), on page 522.

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Hiroshi Yamauchi, Professor Emeritus
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Julian Youmans, Professor Emeritus

Admission Requirements and Professional Curriculum. Detailed information can be obtained from the School of Medicine. See also School of Medicine, on page 125.

Courses in the School of Medicine

Curriculum for the School of Medicine

The curriculum for the M.D. degree at the UC Davis School of Medicine is a four-year program providing comprehensive preparation for graduate medical training (internships and residencies) and the practice of medicine. It offers a blend of basic science training and clinical experience with opportunities for research.

The first year curriculum begins in August and extends into May and is organized into two blocks. The basic science portion of the first block includes courses in Molecular Biology, Cell and Tissue Biology, Genetics, Gross Anatomy/Embryology/Radiology, and Human Physiology. The major organizing theme is structure-function along the continuum of hierarchical biologic structure from molecule to cell, tissue and major organ systems. The three year Doctoring curriculum begins with Doctoring 1, which is presented concurrently with the other courses. The focus of Doctoring 1 is physical examination training using standardized patients and models, correlated

with concurrent gross anatomy and physiology by organ system. Behavioral medicine, epidemiology, cross-cultural medicine, and ethics are woven into the cases and didactic presentations and team-based learning modules. Cases are used in the problem-based learning approach to correlate basic science courses with concepts in clinical medicine, and to explore psychosocial issues. Students are required to attend preceptorships in the community and participate in home visits. Periodic quizzes and review sessions are used in the basic science courses throughout the block for formative assessment, and all courses administer comprehensive summative final examinations in December.

The second block of the first year curriculum begins in January and extends through April, with final exams in early May. There are two major threads, each of which is composed of several integrated courses. The Doctoring 1 course is offered concurrently. The Immunology/Microbiology/Pharmacology/Pathology thread presents an introduction to host defense, infection, basic pharmacologic principles, and general pathologic processes. The Metabolism/Endocrinology/Nutrition/Reproduction (MERN) thread covers essential concepts in metabolism, basic and clinical nutrition, reproductive medicine, and clinical endocrinology. The general pathology course also includes male-female GU and endocrine pathology, and the pharmacology course covers antibiotics and endocrine pharmacology, with the goal of integration with concurrent courses. Periodic quizzes and review sessions provide formative feedback, and final examinations are used for summative assessment. The Doctoring 1 course continues with an emphasis on interviewing skills and clinical assessment, and the course also introduces students to epidemiology and biostatistics through didactic and small group sessions. Cases are used in the problem-based learning approach for basic-science-clinical correlation, and for the exploration of psychosocial issues. Preceptorships and home visits continue. The Doctoring 1 course concludes with a comprehensive final examination, and also includes an observed complete history and physical examination.

The first year curriculum ends with a six week unscheduled block that may be used for vacation, remediation, electives, research, and international experiences.

The second year curriculum is composed of three blocks (Blocks 3-5). Block 3 begins in late June and extends through August with a neurosciences block composed of integrated neuroanatomy-clinical neurosciences. The latter emphasizes the pathophysiology of common neurological disorders. The systemic pathology curriculum continues with a focus on neuropathology, and the pharmacology course covers neuropharmacology. A clinical psychiatry course is also presented during this period. The Doctoring 2 course begins, focusing on advanced clinical skills and clinical reasoning using a combination of standardized patient assessments, problem-based learning, subspecialty physical examination sessions, preceptorships, and didactics in clinical epidemiology, medical economics, and socio-behavioral medicine. The remainder of the second year is devoted to two major blocks composed of pathophysiology courses with tight integration of the systemic pathology and pharmacology courses. The courses are organized according to organ system (cardiovascular, pulmonary, renal, musculoskeletal system, and hematology in Blocks 4 and 5, gastroenterology, oncology, and dermatologyin Block 5). The Doctoring 2 curriculum continues concurrently with its focus on advanced clinical skills, epidemiology, ethics, and problem based assessment. History taking and physical diagnosis skills are correlated with the ongoing pathophysiology courses. Like the first year, all of the second year courses utilize periodic quizzes and review sessions and a comprehensive final examination. The Doctoring 2 course includes an objective structured clinical examination (OSCE) using standardized patients at the end of the course series.

The second year curriculum ends in February and is followed by a six week, unscheduled block for preparation for USMLE Step 1, remediation, electives, and vacation.

The third-year program begins in April and includes six required clerkship rotations in the clinical specialties: eight weeks each of surgery, medicine, obstetrics/gynecology, pediatrics, primary care (jointly administered by Family and Community Medicine and Internal Medicine) and psychiatry. Students may elect to defer one of the required clerkships to the fourth year. The third year Doctoring program consists of longitudinal small groups led by faculty members who remain with their group throughout the year as the students rotate through their clerkships. Doctoring 3 themes include advanced interviewing techniques, clinical reasoning, clinical epidemiology, evidence-based medicine, and ethics/jurisprudence. Students must take a comprehensive clinical skills examination at the end of the third year which features self-assessment and faculty feedback.

The fourth year curriculum features built-in flexibility to allow students to individualize their medical careers. The early start to the fourth year in May allows students to pursue electives for early exposure to clinical specialties or to complete clerkships which may have been deferred. All students are required to select 32 weeks of clinical learning activities in addition to a single 4 week special study module or scholarly project. The Special Study modules are designed to integrate basic sciences with clinical sciences, provide opportunities for students to practice and refine fundamental skills in critical appraisal and analysis of emerging scientific developments, and to allow students to focus in-depth on a multidisciplinary topic of special interest to the student. The Scholarly Project requires independent inquiry with faculty mentorship and leads to a publishable manuscript and student presentation of the project at a research forum held in the spring.

Individual student programs are designed under the guidance of college directors, mentors and faculty advisors, with the support of the Career Advising Office. Each student's fourth year program must be approved by the Fourth Year Oversight Committee to ensure appropriate breadth, depth, and vigor. There are strict guidelines for the choices and time allowed away from the home institution. The fourth year curriculum also provides 12 weeks of unscheduled time for research, Acting Internships, residency interviews, national board study, vacation, or other elective experiences.

To satisfy the M.D. degree program, the student must successfully complete the required course work, clerkships, and fourth year requirements. Students must pass USMLE Step 1, USMLE Step 2 CS and CK, and complete the fourth year clinical performance examination. Students who enter the program with advanced training in one of the areas required for the program are permitted to substitute required courses with electives of equal credit. In addition to the fourth-year elective program available, there is the opportunity for students to select from a variety of electives during the first two years. Examples include electives in medical economics, history of ethics and medicine, medical Spanish, insights in clinical research. Most students also participate in one of several student-run, community clinics for elective credit during their first and second years.

Coordination with other Advanced Degree Programs

The curriculum for the M.D. degree provides flexibility and encourages coordination with other advanced degree programs (Ph.D., M.S., M.A., M.B.A., and M.P.H.). These programs offer a wide breadth of study areas and draw upon the considerable expertise of the entire campus faculty. The School of Public Health offers an M.P.H. program in conjunction with the M.D. program. This program is designed for students interested in disease prevention and community health, health professionals and State Health Department employees.

School of Medicine administrators enthusiastically support students interested in pursuing advanced degree programs. The dual-degree program for the M.D./Ph.D. is targeted to train physicians to meet, respond to and solve the broad diversity of problems and dilemmas facing current and future health care. Students are encouraged to seek degrees in any of the campus wide Ph.D. programs, including those in social sciences and humanities. The UC Davis School of Medicine awards competitive fellowships each year to students enrolled in the M.D./Ph.D. program.

Required Curriculum for the M.D. Degree

The following listing is the typical sequencing of all courses required for earning the M.D. degree. Course descriptions are given under the individual departmental course offerings.

First-Year Required Courses

Year 1, Block 1
- Molecular and Cell Biology, BCM 410A
- Gross-Radiologic-Developmental Anatomy, CHA 400
- Human Physiology, HPH 400
- Human Microscopic Anatomy, CHA 402
- Genetics, OBG 420
- Doctoring 1, MDS 411A

Year 1, Block 2
- Medical Immunology, MMI 480A
- Medical Microbiology, MMI 480B
- General and Endocrine Pathology, PMD 410A
- Pharmacology, PHA 400A
- Metabolism-Endocrine-Reproduction-Nutrition, "MERN," IMD 405
- Doctoring 1, MDS 411B

Second-Year Required Courses

Year 2, Block 3
- Neuroanatomy, CHA 403
- Systemic Pathology, PMD 410B
- Pharmacology, PHA 400B
- Clinical Neurosciences, NEU 420
- Fundamentals of Clinical Psychiatry, PSY 403
- Doctoring 2, MDS 421A

Year 2, Block 4
- Cardiovascular System, IMD 420D
- Pulmonary and Critical Care, IMD 420C
- Nephrology, IMD 420E
- Hematology, IMD 420A
- Systemic Pathology, PMD 410C
- Pharmacology, PHA 400C
- Doctoring 2, MDS 421B

Year 2, Block 5
- Integumentary System, DER 420
- Muscoloskeletal System, OSU 421
- Systemic Pathology, PMD 410C
- Pharmacology, PHA 400C
- Doctoring 2, MDS 421B
- Oncology, HON 420
- GI System, IMD 420B
- Doctoring 2, MDS 421C

Third- and Fourth-Year Required Courses

Third-Year Clerkships
- Internal Medicine 430, Medicine Clerkship ..... 8 weeks
- Surgery 430, Surgery Clerkship ..... 8 weeks
- Pediatrics 430, Pediatrics Clerkship ..... 8 weeks
- Family and Community Medicine 430, Primary Care Clerkship ..... 8 weeks
- Obstetrics and Gynecology 430, Obstetrics and Gynecology Clerkship..... 8 weeks
- Psychiatry 430, Psychiatry Clerkship ..... 8 weeks
- Doctoring 3, MDS 430

Fourth-Year Requirements
- 32 weeks of learning experiences.
- Single 4 week period special study module or scholarly project.
- Clinical experiences are chosen by the student in consultation with, and with

approval of, the Fourth Year Oversight Committee.
The fourth-year curriculum also allows for 12 weeks of undesignated time (electives, interviews, free time).

Medical Sciences (MDS)

Lower Division Course

99. Special Study in Medicine for Undergraduates (1-5)
Independent study—3-15 hours. Prerequisite: consent of instructor. Participate in research projects relating to medicine with faculty in the School of Medicine. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Kumari

Upper Division Course

192. Medical Education Internship for Advanced Undergraduates (1-12)
Internship—3-36 hours. Prerequisite: competency with computers. Enrollment dependent on availability of intern positions. Participate in projects related to curriculum development in support of curriculum for M.D. degree. Gain work experience and appreciation for innovative approaches to learning in basic and clinical sciences of medical education. May be repeated for credit for up to 12 units. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Kumari

Professional Courses

401. Applications of Computers to Medical Practice (2)
Autotutorial—2 hours. Prerequisite: enrollment in medical school. Proficiency in computer applications relative to practice of medicine, with emphasis on e-mail, literature searching, file transfer, and hospital information services. Course given online, at home or in lab; time and place determined by student. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Huntley

411A-411B. Doctoring 1 (4-5)
Discussion—1, 1.5; clinical activity—1, 1.5,; lecture/discussion—1, 1.8. Prerequisite: approval of committee on student progress; medical students only. Small, case-based learning groups with training in patient communication and interviewing techniques, clinical identification and problem solving, applications of social, psychological, cultural, bioethical, and basic science concepts to patient case scenarios, outpatient clinical experiences and didactic presentations. (Deferred grading only, pending completion of sequence. P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Callahan, Eidson-Ton, Jerant, Johl, Servis

421A. Doctoring 2 (6)
Discussion—1 hour; lecture/discussion—1 hour; internship—0.5 hours. Prerequisite: approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social and clinical science to clinical cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (Deferred grading only, pending completion of sequence. P/F grading only.)—IV. (IV.) Cox, Lee

421B. Doctoring 2 (6)
Discussion—1 hour; lecture/discussion—1 hour; internship—0.5 hours. Prerequisite: approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social & clinical science concepts to cases in small groups. History, physical examination with preceptors. Didactics in epidemiology, ethics, sexuality, and clinical reasoning. Evaluation of professional competencies, attitudes and skills needed in the practice of medicine. (Deferred grading only, pending completion of sequence. P/F grading only.)—I. (I.) Cox, Lee

421C. Doctoring 2 (6)
Discussion—1 hour; lecture/discussion—1 hour; internship—0.5 hours. Prerequisite: approval by the School of Medicine Committee on Student Progress; medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (P/F grading only.)—II. (II.) Cox, Lee

430A. Doctoring 3 (2)
Discussion—3 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social and clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—IV. (IV.) Cox, Rose, Wilkes

430B. Doctoring 3 (2)
Discussion—2 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—I. (I.) Cox, Rose, Wilkes

430C. Doctoring 3 (2)
Discussion—2 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—II. (II.) Cox, Rose, Wilkes

430D. Doctoring 3 (2)
Discussion—2 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Application of multidisciplinary basic, social & clinical science concepts to clinical cases in small group discussions facilitated by medical school faculty. Evaluation of professional competencies, attitudes and skills needed in the practice of clinical medicine. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—III. (III.) Cox, Rose, Wilkes

440A. Doctoring 4 Teaching Fellowship (1)
Discussion—0.5 hours; seminar—0.25 hours. Prerequisite: courses 430ABCD and approval by Instructor of Record. Restricted to Medical students only. Instruction on teaching methodology and pedagogy. Mentored teaching of junior medical students in seminar, lecture, and bedside. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—IV. (IV.) Wilkes

440B. Doctoring 4 Teaching Fellowship (1)
Discussion—0.5 hours; seminar—0.25 hours. Prerequisite: courses 430ABCD and approval by Instructor of Record. Restricted to Medical students only. Instruction on teaching methodology and pedagogy. Mentored teaching of junior medical students in seminar, lecture, and bedside. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—I. (I.) Wilkes

440C. Doctoring 4 Teaching Fellowship (1)
Discussion—0.5 hours; seminar—0.25 hours. Prerequisite: courses 430ABCD and approval by Instructor of Record. Restricted to Medical students only. Instruction on teaching methodology and pedagogy. Mentored teaching of junior medical students in seminar, lecture, and bedside. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—II. (II.) Wilkes

441. Combined Ophthalmology and Otolaryngology Clerkship (6)
Clinical activity—4 weeks. Prerequisite: approval by Committee on Student Promotion and Evaluation. Fundamental knowledge of ophthalmology and otolaryngology for the treatment of eye, ear, nose and throat problems at a level of training of general physicians, including when to refer patients to a specialist. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Brandt, Strong

450. Introduction to UC Davis Medical Center (1)
Seminar—20 hours total. Prerequisite: second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (H/P/F grading only.)—III. (III.)

460CR. Introduction to Clinical Research (2)
Lecture—2 hours; independent study—3 hours. Prerequisite: consent of instructor; completed one of the following degrees: M.D., D.D.S., D.M.D., O.D., N.D., D.O., Pharm.D., D.V.M., Ph.D. or D.N.S. in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program. Introduction to the CRGG program and overview of major clinical research topics. Overview of basic clinical skills needed to accomplish CRGG mentored research project. (P/F grading only.)—IV. (IV.) Frederick

461CR. Strategies for Grant Writing (2)
Lecture/discussion—2 hours. Prerequisite: consent of instructor; completed M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program. Practical skills and strategies to create successful grant proposals in the NIH style and format. Generating ideas, identifying and accessing research resources, grant components, specific aims, background and significance, preliminary studies, budgets, and bios. Matriculation through UC system, and resubmissions. (S/U grading only.)—IV. (IV.) Rutledge

462CR. Introduction to Clinical Epidemiology and Study Design (3)
Lecture—25 hours; discussion—10 hours. Prerequisite: completed M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into Clinical Research Graduate Group, K30 program. Anatomy and physiology of conducting clinical epidemiologic research. Familiarity with three basic study designs (cross-sectional, case-control, and cohort). Discussion of principles of measurements in clinical epidemiological studies, basic methods for analyzing data, and ethical issues involved in conducting research. (S/U grading only.)—IV. (IV.) McCurdy, Romano

463CR. Methods in Clinical Research (5)
Lecture—3 hours; discussion—2 hours. Prerequisite: consent of instructor; completed M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into Clinical Research Graduate Group, K30 program. Overview of major approaches to clinical research, including health services research techniques, informatics, the GCRC, and preclinical methodologies to enhance clinical projects. Overview of UC Davis clinical research support infrastructure. Methodologies applicable to clinical research and its multi-disciplinary perspective. (S/U grading only.)—IV. (IV.) Berglund, Lloyd, Kravitz

464CR. Responsible Conduct of Research (3)
Lecture—3 hours. Prerequisite: completed M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into Clinical Research Graduate Group, K30 program. The nine NIH-mandated modules: Data Acquisition and Reporting, Mentor Training, Publication Practices and Authorship, Peer Review/Grant Process, Collaborative Science, Human Subjects, Research with Animals, Conflict of Interest, Research Misconduct, and Entrepreneurship/Industry Collaborations/Intellectual Property/Technology Transfer. (S/U grading only.)—IV. (IV.) Wun

465CR. Introduction to Medical Statistics (4)
Lecture—3 hours; laboratory—2 hours. Prerequisite: completed M.D., D.D.S, D.M.D., O.D., N.D., Pharm.D., D.V.M., Ph.D., or D.N.S. in nursing; application and acceptance into Clinical Research Graduate Group, K30 program. Biomedical appli-

cations of statistical methods in clinical, laboratory and population medicine. Graphical/tabular data presentation, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary non-parametric methods, simple linear regression/correlation, life tables. Microcomputer applications of statistical procedures in population medicine. (S/U grading only.)—IV. (IV.) Becket, Wegelin

470. Introduction to Dentistry (3-18)
Clinical activity—34 hours; lecture—6 hours. Prerequisite: fourth-year medical student in good standing; consent of instructor. Introduction to Dentistry and basic Oral and Maxillofacial Surgery. Course is offered by the Oral and Maxillofacial Surgery department at UC San Francisco. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Pogrel, Wallach

480. Insights in Clinical Research (1)
Lecture—1 hour. Prerequisite: medical student in good standing. Seminars on research presented by Medical School faculty; overview of pertinent issues, including medical ethics, human subjects protocols, case control methods, etc. (P/F grading only.)—III. (III.) Kumari

481. Insights into Clinical Specialties (1)
Lecture/discussion—1 hour. Prerequisite: medical student in good standing. Exposure to various medical specialties, their residency programs and ways in which medical students can prepare for and improve their candidacy for such programs. (H/P/F grading only.)—IV. (IV.) Kumari

482. Lecture Series in Reproductive Health (1)
Lecture—1 hour. Psychosocial and public health aspects of providing quality reproductive health care and application in student-run free clinics and in 3rd year clerkships. May be repeated two times for credit. (P/F grading only.)—II. (II.) Paik

483. Insights in Political, Legal and Business Aspects of Medicine (1)
Lecture—1 hour. Prerequisite: medical students in good standing. The practical aspects of a medical career. May be repeated two times for credit. (P/F grading only)—III. (III.) Kumari

487. History and Ethics of Medicine (1)
Lecture—1.25 hours. Introduction to ethical problems and events in health care in both modern and historical contexts. Historical topics in medicine and medical ethics. (P/F grading only.)—II. (II.) Fitzgerald

489. Directed Studies (1-9)
Prerequisite: consent of instructor; individual directed studies in extended preparation for modified curriculum, USMLE exams, and/or as required by Committee on Student Progress. Independent studies to accommodate modified curriculums, prepare for taking USMLE exams and for remediation course work directed by the Committee on Student Progress. May be repeated for credit. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Nuovo

493A. International and Comparative Health Care—SSM (6)
Discussion—20 hours; lecture—10 hours. Prerequisite: consent on instructor. Restricted to UC Davis School of Medicine students only. Through a series of lectures, seminars and clinical experiences, all occurring in other nations, students will research how health care systems address critical health issues. In 2007, Chronic Disease is the focal issue. SSM Component. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—II, III. (II, III.) Wilkes

493B. International and Comparative Health Care—Clinical (6)
Clinical activity—30 hours. Prerequisite: consent on instructor. Restricted to UC Davis School of Medicine students only. Through a series of lectures, seminars and clinical experiences, all occurring in other nations, students will research how health care systems address critical health issues. In 2007, Chronic Disease is the focal issue. Clinical Component. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—II, III. (II, III.) Wilkes

495. Medicine Literature Review (1-9)
Discussion—3-27 hours. Prerequisite: medical student in good academic standing and permission of the Associate Dean of Curricular Affairs. Independent study: topics for selection include, but are not restricted to, medical ethics, economics and jurisprudence, culture and medicine, ethnicity and medicine, gender and medicine, history of medicine, health manpower, and medical education. A prepared paper on the selected topic will be required. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Kumari

497A. Scholarly Project (2)
Seminar—0.25 hours; independent study—0.5 hours. Prerequisite: project proposal must be accepted by the Scholarly Project Executive Committee (SPEC). Restricted to fourth year medical school students only. Develop a research project on a focused topic area, implements the research, writes a publishable paper, and presents an oral summary of the project. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—IV. (IV.) Schaefer

497B. Scholarly Project (2)
Seminar—0.25 hours; independent study—0.5 hours. Prerequisite: Project proposal must be accepted by the Scholarly Project Executive Committee (SPEC). Restricted to fourth year medical school students only. Develop a research project on a focused topic area, implements the research, writes a publishable paper, and presents an oral summary of the project. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—I. (I.) Schaefer

497C. Scholarly Project (2)
Seminar—0.25 hours; independent study—0.5 hours. Prerequisite: Project proposal must be accepted by the Scholarly Project Executive Committee (SPEC). Restricted to fourth year medical school students only. Develop a research project on a focused topic area, implements the research, writes a publishable paper, and presents an oral summary of the project. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—II. (II.) Schaefer

499. Research in Medical Education and Curriculum Development (4-9)
Independent study—10-36 hours. Prerequisite: medical student in good standing and competency with computers. Research and development of an independent project related to expanding computer-assisted resources in support of the MD curriculum at UC Davis. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Kumari

Departmental Courses:

Anesthesiology and Pain Medicine (ANE)

Upper Division Course

192. Internship in Anesthesiology (1-6)
Internship—3 to 18 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in anesthesia and related fields. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Professional Courses

460. Anesthesiology Clinical Clerkship (3-18)
Full-time clinical activity (3 full days per unit). Prerequisite: medical student. In-depth exposure to anesthesia through informal lectures and mentoring by anesthesiologists. Emphasis on understanding and applying anesthetic principles in managing administration of general, regional, and specialized areas. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Rivera

463. Multidisciplinary Pain Management (6)
Clinical Activity—30 hours; lecture/discussion—10 hours. Prerequisite: senior medical student in good standing. Senior clerkship to expose students to all facets of treating pain in all aspects of clinical care: outpatient and inpatient settings, acute and chronic pain, end of life issues, pediatrics, rehabilitation, etc. Daily clinics, rounds, and lectures. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Galicia

480. Brief Introduction to Clinical Anesthesiology and Chronic Pain Management (3)
Clinical activity—25-30 hours (two weeks). Prerequisite: second-year medical student. Daily experience in clinical anesthesiology at the preoperative screening unit, operating room, post anesthesia care unit, chronic pain management clinic with daily clinical correlation case discussions, and one-on-one interaction with faculty anesthesiologists. (H/P/F grading only.)—II. (II.) Fishman

493A. Applied Physiology and Pharmacology (6)
Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor; UC Davis School of Medicine students only. This course will review and demonstrate the application of basic physiology and pharmacology to patient care. There will be an in-depth analysis of the physiology and pharmacology of the cardiovascular, pulmonary, nervous, renal and endocrine systems. Limited enrollment. (H/P/F grading only.)—II. (II.) Antogini

493B. Interdisciplinary Medicine in Pain Care (6)
Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor; UC Davis School of Medicine students only. This course will integrate applied and practical neuroanatomy, physiology, pharmacology, psychology/psychiatry and social medicine in the care of patients who are receiving care for pain caused by acute or chronic medical disease or trauma. Limited enrollment. (H/P/F grading only.)—III. (III.) Fishman

498. Individual or Group Study (1-5)
Discussion—1-5 hours; laboratory—2-10 hours. Prerequisite: interns and residents with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

499. Anesthesiology Research (4-18)
Laboratory—12-54 hours. Prerequisite: third- or fourth-year medical students, advanced standing undergraduate and veterinary medicine students; or consent of instructor. Problems in clinical and/or laboratory research. May be repeated for credit. (H/P/F grading only for medical students.)—I, II, III, IV. (I, II, III, IV.)

Biological Chemistry (BCM)

Lower Division Course

92. Internship in Biological Chemistry (1-12)
Internship—3-36 hours; final report. Prerequisite: consent of instructor. Supervised work experience in biological chemistry and related fields. (P/NP grading only.)

Upper Division Courses

192. Internship in Biological Chemistry (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to internship by preceptor. Supervised work experience in Biological Chemistry and related fields. (P/NP grading only.)

198. Group Study (1-5)
Prerequisite: consent of instructor. For undergraduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

209. Prostaglandins/Leukotrienes and Related Lipids (2)
Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B or Physiology 100A-100B. Oxidative desaturation/elongation of poyunsaturated fatty acids. Biosynthesis of prostaglandins/leukotrienes from polyunsaturated fatty acids. Chemistry, biochemistry, and metabolism. Nutritional regulation. Physiological/pathophysiological implications; pharmacological and clinical relevance. Offered in alternate years.—(II.) Ziboh

214. Molecular Medicine (1)
Discussion—1 hour. Prerequisite: course in molecular genetics, molecular and cellular biology, biochemistry or the equivalent. Series of lectures on current topics of molecular genetics related to medicine. Material stresses concepts derived from genetic research which have some potential clinical relevance. (Same course as course 414.) (S/U grading only.)—II. (II.) Seldin

217. Molecular Genetics of Fungi (3)
Lecture—3 hours. Prerequisite: graduate standing in a biological science; Biochemistry 101B; Genetics 100, 102A; Botany 119; Plant Pathology 130, 215X; Microbiology 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. Offered in alternate years. (Same course as Plant Pathology 217.)—II. Holland, Tyler

222. Mechanisms of Translational Control (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: Biochemistry 201C or consent of instructor. Molecular mechanisms of protein synthesis and translational control in eukaryotic cells, with emphasis on mammalian cells and their viruses. An advanced graduate-level treatment of topics of current interest, with readings and discussion of primary papers from the literature. Offered in alternate years.—II. Hershey

230. Practical NMR Spectroscopy and Imaging (1)
Lecture—1 hour. Prerequisite: Chemistry 107A-107B, Physics 5A-5B-5C or 9A-9B-9C, or consent of instructor. Basic theory, experimental methods, and instrumentation of NMR. Enables students to understand NMR spectroscopy and imaging experiments. (S/U grading only.)—I. (I.)

231. Biological Nuclear Magnetic Resonance (3)
Lecture—3 hours. Prerequisite: Molecular and Cellular Biology 221A or the equivalent or consent of instructor. Principles and applications of magnetic resonance in biomedicine. Fundamental concepts and the biophysical basis for magnetic resonance applications in areas of tissue characterization/imaging, metabolic regulation, and cellular bioenergetics. (Same course as Biophysics 231.)—III. (III.) Jue

291. Seminar in Genetic Approaches to Pathogenesis of Human Disease (1)
Seminar—1 hour. Prerequisite: student in Genetics Graduate Group of consent of instructor. Current genetic approaches to understanding the pathogenesis of disease and mammalian development presented and critically discussed by faculty, fellows and students. Topics include Mendelian and non-Mendelian diseases, imprinting, homologous recombination, statistical methods, genetic epidemiology and cell cycle dependent expression. (Same course as course 491.) (S/U grading only.)—I, II, III, IV. (I, II, III, IV.)

298. Group Study (1-5)
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

405. Metabolism, Endocrinology, Reproduction and Nutrition (9.5)
Lecture—3.8 hours; discussion/laboratory—2.8 hours. Prerequisite: consent of instructor; medical students only. Basic and pathophysiologic processes involved in human metabolic and nutritional regulation and in reproductive and endocrine control systems across the lifespan. Integrate information across these systems and use clinical reasoning process to identify and understand relevant perturbations and diseases. (Same course as Human Physiology 405, Internal Medicine 405, Obstetrics and Gynecology 405) (Deferred grading only, pending completion of sequence. P/F grading only.)—II, III. (II, III.) Sweeney, Towner, Turgeon

410A. Biochemistry and Molecular Biology (3.5)
Lecture—3 hours. Prerequisite: consent of instructor. Medical Students only. Biochemistry of proteins and nucleic acids, followed by molecular genetics, regulation of gene expression, biomembranes and structural proteins. Applications to clinically relevant systems are emphasized, particularly cysticic fibrosis, synaptic conductance, muscular dystrophy, and oncogenes and cell proliferation control. (Deferred grading only, pending completion of sequence.)(P/F grading only.)—I, IV. (I, IV.) Carraway, Chen

414. Molecular Medicine (1)
Discussion—1 hour. Prerequisite: course in molecular genetics, molecular and cellular biology, biochemistry or the equivalent. Series of lectures on current topics of molecular genetics related to medicine. Material stresses concepts derived from genetic research which have some potential clinical relevance. (Same course as course 214.) (H/P/F grading only.)—II. (II.) Seldin

491. Seminar in Genetic Approaches to Pathogenesis of Human Disease (1)
Seminar—1 hour. Prerequisite: student in Genetics Graduate Group of consent of instructor. Current genetic approaches to understanding the pathogenesis of disease and mammalian development presented and critically discussed by faculty, fellows and students. Topics include Mendelian and non-Mendelian diseases, imprinting, homologous recombination, statistical methods, genetic epidemiology and cell cycle dependent expression. (Same course as course 291.) (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

497T. Tutoring in Biological Chemistry (1-5)
Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.)

498. Group Study (1-5)
Prerequisite: medical students with consent of instructor. (H/P/F grading only.)

499. Research (1-12)
Prerequisite: medical students with consent of instructor. (H/P/F grading only.)

Courses in Cell Biology and Human Anatomy (CHA)

Upper Division Courses

101. Human Gross Anatomy (4)
Lecture—4 hours. Prerequisite: Biological Sciences 2A, concurrent enrollment in Exercise Biology 106L or course 101L strongly recommended. Upper division students only; Pass 1 open to upper division Exercise Biology or Anthropology majors only; Pass 2 open to Seniors in any major; Open enrollment at the start of the quarter for upper division students in any major. Detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. (Same course as Exercise Biology 106.) GE Credit: SciEng.—II. (II.) Gross

101L. Human Gross Anatomy Laboratory (3)
Laboratory—9 hours. Prerequisite: Biological Sciences 2A; must take Exercise Biology 106 or course 101 concurrently (or have already completed). Upper division students only; Pass 1 open to upper division Exercise Biology or Anthropology majors only; Pass 2 open to Seniors in any major; Open enrollment at the start of the quarter for upper division students in any major; mandatory attendance on first day of lab. Detailed study of prosected human cadavers in small group format with extensive hands-on experience. (Same course as Exercise Biology 106L.) GE Credit: SciEng.—II. (II.) Gross

192. Internship in Morphology (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; laboratory science experience including some chemistry; approval of project by preceptor prior to period of internship. Experience of supervised internship in research laboratories of members of the department. (P/NP grading only.)

197T. Tutoring in Cell Biology and Human Anatomy (1-5)
Discussion—1 hour; laboratory—6-9 hours. Prerequisite: completion of course 101 with a grade of B or better and consent of instructor. Provides laboratory instruction in gross and microscopic human anatomy, with small groups of undergraduates under the supervision of the instructor. (S/U grading only.)

198. Directed Group Study (1-5)
Discussion—1-10 hours. Prerequisite: consent of instructor. Directed reading, discussion, and/or laboratory experience on selected topics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200. Graduate Human Gross Anatomy (6)
Lecture—4 hours; laboratory—6 hours. Prerequisite: consent of instructor. Lectures on human gross anatomy and cadaver dissection laboratory. Topics arranged by region; emphasis on osteology, neuromuscular anatomy, cardiovascular anatomy, gastrointestinal anatomy and anatomy of reproductive systems. Only two units of credit for students who have completed course 101. Open only to full-time graduate students.—II. (II.) Blankenship, Gross, Tucker

202. Human Microscopic Anatomy (5)
Lecture—3 hours; laboratory—6 hours. Examines the normal microscopic structure of the basic cells, tissues, and organs of the body. Lectures emphasize morphology and structure-function relationships. Accompanying laboratories involve analysis and identification of sectioned material at the light microscopic and ultrastructural levels.—II. (II.) Beck

203. Neurobiology (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: two upper division or one graduate course in Neurobiology, consent of instructor. Physiology and anatomy of the normal human nervous system in an integrated format.—III. (III.) Blankenship, Gross

290. Seminar (1)
Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)—I, III. (I, III.)

290C. Research Group Conference (1)
Discussion—1 hour. Prerequisite: graduate student with research experience (may be taken concurrently); consent of instructor. Discussion of problems, progress and literature relevant to current research undertaken by laboratory groups in Human Anatomy. (S/U grading only.)—I, II, III. (I, II, III.)

298. Advanced Group Study (1-5)
Prerequisite: consent of instructor.

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

400. Developmental, Gross, and Radiologic Anatomy (7.5)
Lecture—3 hours; laboratory—5 hours. Prerequisite: consent of Committee on Educational Progress. Medical Students only. An integrated presentation of developmental, gross and radiologic anatomy. Embryology and radiology correlated with the dissection of the entire body. Embryology from implantation to birth. (Deferred grading only, pending completion of sequence.) (P/F grading only.)—I, IV. (I, IV.) Tucker

402. Cell and Tissue Biology (4.5)
Lecture—2 hours; laboratory—4 hours. Prerequisite: approval of the Committee on Student Progress. Medical Students only. Microscopic structure of the basic cells, tissues and organs of the body with an emphasis on how structure explains function. Analysis and identification of sectioned material at the light microscopic and ultrastructural levels. (Deferred grading only, pending completion of sequence.) (P/F grading only.)—I, IV. (I, IV.) Beck

403. Medical Neuroanatomy (5)
Lecture—3 hours; laboratory—1 hour; discussion/laboratory—1 hour. Prerequisite: successful completion of course 400, block 1; restricted to medical students only. Anatomy of the normal human nervous system, to include gross external and internal morphology of brain and spinal cord, and function neuroanatomy of motor, sensory and cognitive systems. Incorporates application of neuroanatomy to clinical problem solving. (Same course as Human Physiology 403.) (P/F grading only.)—IV. (IV.) Blankenship, Gross

493. Clinically-Oriented Anatomy Special Study Module (6)
Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. Restricted to School of Medicine students only. Reviews aspects of the anatomy of the head and neck, thoracic cavity, abdomen, pelvis, extremities, vascular system, peripheral nervous system and central nervous system. Focus on the understanding of anatomy related to common surgical procedures. (Same course as Surgery 493.) (H/P/F grading only.)—III. (III.) Blankenship, Khatri

493B. Anatomy Medical Education Special Study Module (6)
Seminar—10 hours; clinical activity—14 hours; autotutorial—6 hours; independent study—10 hours. Prerequisite: consent of instructor; UC Davis School of Medicine students only. Attend all of the lectures and laboratory sessions for courses 400 and 402 during the four-week section (approximately seven anatomy labs and three to four histology labs); tutor first-year students during the laboratory sessions; prepare and present a clinical correlate session. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Beck, Gross, Fitzgerald, Tucker

497T. Tutoring in Human Anatomy (1-5)
Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum for the School of Medicine. (H/P/F grading only.)

498. Advanced Group Study (1-12)
Prerequisite: medical students, interns, and residents with consent of instructor. Directed reading and group discussion and/or laboratory experience on selected topics. (H/P/F grading only.)

499. Research (1-12)
Prerequisite: consent of instructor. (H/P/F grading only.)

Clinical Research (CLH)

Graduate Courses

200. Introduction to Clinical Research (3)
Lecture—2 hours; independent study—3 hours. Prerequisite: one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training programs; consent of instructor. Introduction to the CRGG program and overview of major clinical research topics. Overview of basic clinical skills needed to accomplish CRGG mentored research project. (Formerly Medical Science 460CR.) (S/U grading only.)—IV. (IV.) Meyers

201. Strategies for Grant Writing (2)
Lecture—2 hours. Prerequisite: consent of instructor; completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM/CTSC training program. Practical skills and strategies to create successful grant proposals in NIH style/format. Generating ideas, identifying and accessing research resources, grant components, specific aims, background and significance, preliminary studies, budgets, and bios. Matriculation through UC system, and resubmissions. (Former course Medical Sciences 461CR.) (S/U grading only.)—IV. (IV.) Rutledge

202. Introduction to Clinical Epidemiology and Study Design (3)
Lecture—25 hours; discussion—10 hours. Prerequisite: completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, (K30) program, or other SOM/CTSC training programs; consent of instructor. Anatomy and physiology of conducting clinical epidemiologic research. Familiarity with three basic study designs (cross-sectional, case-control, and cohort). Discussion of principles of measurements in clinical epidemiological studies, basic methods for analyzing data, and ethical issues involved in conducting research. (Formerly Medical Sciences 462CR.) (S/U grading only.)—IV. (IV.) McCurdy, Romano

203. Methods in Clinical Research (5)
Lecture—3 hours; discussion—2 hours. Prerequisite: completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM training programs; consent of instructor. Overview of major approaches to clinical research, including health services research techniques, informatics, GCRC, and preclinical methodologies to enhance clinical projects. Overview of UCD clinical research support infrastructure. Methodologies applicable to clinical research and its multi-disciplinary perspective. (Formerly Medical Sciences 463CR.) (S/U grading only.)—IV. (IV.) Berglund, Kravitz, Murphy

204. Responsible Conduct of Research (3)
Lecture—3 hours. Prerequisite: consent of instructor; completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing. Application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM training program. The nine NIH-mandated modules: Data Acquisition and Reporting, Mentor Training, Publication Practices and Authorship, Peer Review/Grant Process, Collaborative Science, Human Subjects, Research with Animals, Conflict of Interest, Research Misconduct, and Entrepreneurship/Industry Collaborations/Intellectual Property/Technology Transfer. (Former course Medical Sciences 464CR.) (S/U grading only.)—IV. (IV.) Kon, Wun

205. Introduction to Medical Statistics (4)
Lecture—3 hours; laboratory—2 hours. Prerequisite: completed one of the following degrees: MD, DDS, DMD, OD, ND, DO, PharmD, DVM, PhD or DNS in nursing; application and acceptance into the Clinical Research Graduate Group, K30 program or other SOM training program; consent of instructor. Biomedical applications of statistical methods in clinical, laboratory, population medicine. Graphical/tabular data presentation, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression/correlation, life tables. Microcomputer applications of statistical procedures in population medicine. (Formerly Medical Sciences 465CR.) (S/U grading only.)—IV. (IV.) Yang

220. Basics of Stem and Progenitor Cells (1)
Lecture—1 hour. Prerequisite: Molecular, Cellular, and Integrative Physiology 200, 200L; consent of instructor; graduate standing. This is a lecture course designed for graduate students who have experience in cell culture techniques. It is designed to give a broad overview of the field and current cells of interest to the greater research community. (S/U grading only.)—III. (III.) Tarantal

222. Ethical Issues in Stem Cell Biology (1)
Lecture/discussion—1 hour. Prerequisite: consent of instructor; graduate standing. Critical presentation and analysis of recent articles in stem cell biology and small group discussions of the ethical issues surrounding this area of research. (S/U grading only.)—II. (II.) Ikemoto, Rich

230. Congestive Heart Failure, Mechanism of Disease (3)
Lecture/discussion—2 hours; project. Prerequisite: consent of instructor; graduate standing. Underlying mechanisms of cardiomyopathy and heart failure. Presentation of fundamental knowledge of and recent basic research on heart failure. Student team projects: investigation and presentation of a research topic and bench research project to advance research in the same area.—II. (II.) Knowlton

231. Current Techniques in Clinical Research (2)
Lecture—1 hour; clinical activity—3 hours. Prerequisite: consent of instructor and graduate standing; completion of course 250. Current techniques used in clinical research such as electrophysiology, cardiovascular surgery, cardiac catheterization and echocardiography, team science, and patient management. Lectures are presented by experts on each technique, with an emphasis on use in translational research. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.)

240. Predoctoral Clinical Research Training Program Research Integration (1)
Seminar—0.5 hours; discussion—0.5 hours. Prerequisite: consent of instructor and enrollment in the Predoctoral Clinical Research Training Program in the CTSC, School of Medicine. Alternating sessions: journal club, seminar/discussion, and research integration sessions. May be repeated three times for credit (S/U grading only.)—I, II, III. (I, II, III.) Kenyon

250. Integrating Medicine Into Basic Science (6)
Lecture—3.75 hours; discussion—6 hours; seminar—2.5 hours; clinical—8 hours. Prerequisite: consent of instructor; graduate standing; acceptance into HHMI Integrating Medicine into Basic Science program. Four-week summer institute consisting of didactic lectures, reading assignments, group discussions, and clinical rotations to acculturate students to the human medical environment; integrate medical principles, physiology and pathophysiology into basic research; introduce high-impact clinical studies related to medicine and health. (S/U grading only.)—IV. (IV.) Knowlton, Meyers, Robbins

290A. Hot Topics in Clinical Research (1)
Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

290B. Hot Topics in Stem Cell Biology (1)
Seminar—1 hour. Prerequisite: graduate standing. Seminars presented by guest lecturers on subjects of their own research. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Literature in Translational Research (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Critical presentation and analysis of recent journal articles in translational research by students. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Knowlton

290D. Literature in Translational Research (1)
Discussion—1 hour. Prerequisite: consent of instructor; graduate standing. Critical presentation and analysis of recent journal articles in translational research by students. May be repeated for credit. (S/U grading only.)—I. (I.) Knowlton

298. Group Study in Clinical Research (1-5)
Prerequisite: consent of instructor. Special topics in Clinical Research appropriate for group study at the graduate level. Restricted to students enrolled in the Mentored Clinical Research Training Program. (S/U grading only.)

299. Clinical Research (1-5)
Prerequisite: consent of instructor. Independent research and special topics in clinical research appropriate for graduate level. Restricted to students enrolled in the Mentored Clinical Research Training Program. (S/U grading only.)

Dermatology (DER)

Upper Division Courses

192. Internship in Cutaneous Biology (1-4)
Internship—8-20 hours; final report. Prerequisite: upper division standing or consent of instructor. Approval of project prior to internship by preceptor. Supervised work experience involving research on the skin. (P/NP grading only.)—Isseroff, Takada, Liu

199. Special Study in Cutaneous Biology (1-4)
Prerequisite: advanced undergraduate standing and/or consent of instructor. Special study by individual arrangement of specialized topics in biology of skin. Work may be assigned readings, laboratory research or a combination. (P/NP grading only.) Isseroff, Liu, Maverakis

Graduate Course

299. Research in Cutaneous Biology (1-12)
Laboratory—3-36 hours. Prerequisite: consent of instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (S/U grading only.) Isseroff, Liu, Maverakis, Murphy, Takada

Professional Courses

420. Integumentary System (2)
Lecture/discussion—4 hours. Prerequisite: approval of School of Medicine Committee on Student Progress; medical students only. Cell biology, pathology, and physical diagnosis of the skin. Recognition of normal variations, and common or important dermatoses. Patient demonstrations of select conditions. (P/F grading only.)—IV. (IV.) Eisen, Isseroff

460. Dermatology Clinical Clerkship (6)
Clinical activity (inpatient/outpatient service)—40 hours for four weeks. Prerequisite: completion of three years of medical school; or consent of instructor. Observation and participation in dermatology clinics/practice and participation in Ward Rounds and Dermatology Clinics at UC Davis Medical Center, Kaiser, and private practitioner offices. Limited enrollment.—I, II, III, IV. (I, II, III, IV.) Youker

470. Introduction to Dermatopathology (6)
Clinical—20 hours; independent study—20 hours; lecture/discussion—6 hours. Prerequisite: previous rotation in a Dermatology Clerkship; consent of instructor. Restricted to fourth year medical student. Integrated, multi-specialty approach to the microscopic diagnosis of inflammatory and neoplastic skin disorders. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Barr, Fung, Konia

480. Insights in Dermatology (1-3)
Clinical activity—3-9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Clinical experience limited to observation of delivery of dermatologic care and attendance at some conferences. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

495. Wound Healing: From Bench to Bedside (6)
Clinical activity—12 hours; laboratory—8 hours; autotutorial—15 hours; term paper. Prerequisite: medical students only. An integrated, multi-specialty approach to clinical soft tissue wound healing.—I, II, III, IV. (I, II, III, IV.) Isseroff

498. Special Topics in Clinical Dermatology (1-6)
Independent study—3-18 hours. Prerequisite: medical students with consent of instructor. Individually arranged study of special topics in clinical dermatology determined by student and instructor. Assigned readings and/or clinical examination of selected patients. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV) Armstrong

499. Research in Cutaneous Biology (1-12)
Laboratory—3-36 hours. Prerequisite: consent of instructor. Research, either laboratory or clinical, on ongoing projects within the department under supervision of faculty. (H/P/F grading only.)—Armstrong, Liu, Maverakis

Emergency Medicine (EMR)

Lower Division Course

92. Emergency Medicine Clinical Research Internship (1-4)
Prerequisite: Undergraduate student in good academic standing at UC Davis; consent of instructor. This course is intended to give the undergraduate student an opportunity to conduct "hands-on" clinical research in the Emergency Department. Through the lecture/discussion, students will learn the basics of conducting and developing clinical research studies, using examples from ongoing studies. May be repeated for credit up to four units. Units awarded will depend on hours worked.—I, II, III, IV. (I, II, III, IV.) Panacek

Upper Division Courses

192. Emergency Medicine Clinical Research Internship (1-4)
Internship—6-12 hours. Prerequisite: undergraduate student in good academic standing at UC Davis; consent of instructor. Intended to give the upper division undergraduate student an opportunity to conduct "hands-on" clinical research in the Emergency Department. Through the lecture/discussion, students learn the basics of conducting and developing clinical research studies. May be repeated two times for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Panacek

199A. Special Study for Advanced Undergraduates (4-12)
Prerequisite: open to experienced RA's who have successfully performed in the EMRAP program for a minimum of three quarters; consent of instructor. This course is for those are interested in working on specific EM projects in a more extensive way. Must commit at least 4 hours per week for two quarters. Must have database skills. Deferred grading only, pending completion of sequence.)—I, II, III, IV. (I, II, III, IV.) Panacek

Professional Courses

401. Preceptorship in Emergency Medicine (1-4)
Clinical activity—6 hours; tutorial—2 hours. Prerequisite: consent of instructor and completion of first year of medical school. Exposure to the specialty of Emergency Medicine and observation of a wide array of patients in the Emergency Department. A literature review of an Emergency Medicine topic of interest to the student must be performed and discussed. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Laurin

430. Introduction to Medical Toxicology (3-6)
Prerequisite: fourth-year medical student with consent of instructor. Student will become familiar with the resources available to manage exposure and poison cases. Hands-on training in the use of Poisindex® computer database. Additional readings from medical literature required. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Sutter

440. Emergency Medicine Required Clerkship (6)
Clinical activity—46 hours; lecture/discussion—8 hours. Prerequisite: satisfactory completion of Medicine, Surgery, and Pediatric Clerkship. Student will see patients primarily in the Emergency Department under the supervision of an Emergency Medicine Attending. Emphasis will be on the recognition and management of acute life threats, as well as the treatment of common medical and surgical conditions. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Laurin

445. Emergency Medicine Ultrasound for Fourth-Year Medical Student (3-6)
Prerequisite: fourth-year Medical Student in good standing; interest in Emergency Medicine or Critical Care is recommended; course 440 or equivalent is recommended prior to the rotation. Intended for students interested in learning both the technical and cognitive skills of bedside ultrasound. Emphasis will be on the use of ultrasound in emergency medicine as a diagnostic tool and in procedural guidance. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Cusick

450. Ambulatory Care Clerkship (6)
Clinical activity—full time (4 weeks). Prerequisite: Medicine, Surgery, and one month of Emergency Medicine Clerkship. Ambulatory care experience in the "fast track" area of the Emergency Department. Exposure to patients with minor illnesses and injuries. Emphasis on wound management and treatment of orthopaedic injuries. (Former course Internal Medicine 440.) (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Laurin

465. Acting Internship in Emergency Medicine (6)
Clinical activity—36 hours; lecture/discussion—4 hours. Prerequisite: satisfactory completion of Medicine, Surgery, Pediatric and Emergency Medicine Clerkship. The student will function as an Acting Intern and treat a wide variety of patients and problems under the supervision of the Emergency Medicine Attending. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Laurin

470. Pediatric Emergency Medicine Clerkship (6)
Clinical activity—36 hours; lecture/discussion—4 hours. Prerequisite: satisfactory completion of Medicine, Surgery, Pediatrics. Restricted to fourth-year medical student in good standing only. See patients in the Pediatric area of the Emergency Department under the supervision of an Emergency Medicine Attending. Emphasis on recognition and management of the acutely ill pediatric patient and treatment of common pediatric complaints. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Vance

490. Emergency Procedures Elective (3)
Lecture/discussion—24 hours; web virtual lecture—8 hours; tutorial—4 hours; independent study—4 hours. Prerequisite: current basic life support (BLS) certification. Restricted to fourth-year medical student in good standing only. Simulator-based skills training for emergency procedures. Topics include airway management, central venous access, chest tube placement, and general critical care resuscitation skills. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Bair

493A. Teaching the Basic Sciences SSM (2)
Lectrue—6 hours; lecture/laboratory—8 hours; laboratory—30 hours; tutorial—10 hours. Prerequisite: consent on instructor. Restricted to UC Davis School

of Medicine students only. Special Studies Module, a yearlong in progress court to teach lecture and discussion education technique and theory. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—IV. (IV.) Wilkes

493B. Teaching the Basic Sciences SSM (2)
Lectrue—6 hours; lecture/laboratory—8 hours; laboratory—30 hours; tutorial—10 hours. Prerequisite: consent on instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a yearlong in progress court to teach lecture and discussion education technique and theory. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—I. (I.) Wilkes

493C. Teaching the Basic Sciences SSM (2)
Lectrue—6 hours; lecture/laboratory—8 hours; laboratory—30 hours; tutorial—10 hours. Prerequisite: consent on instructor. Restricted to UC Davis School of Medicine students only. Special Studies Module, a yearlong in progress court to teach lecture and discussion education technique and theory. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—II. (II.) Wilkes

499. Research (2-18)
Laboratory—full time (1 to 12 weeks). Prerequisite: consent of instructor. Elective where topics may be selected in either basic or clinical research areas of Emergency and/or Critical Care Medicine. The goals will be tailored to each individual student. Enrollment requires prior discussion and consent of instructor. (H/P/F grading only.)

Family and Community Medicine (FAP)

Lower Division Course

92C. Primary Care Clinics (2)
Clinical activity—6-8 hours; seminar—2 hours; lecture—1-2 hours. Prerequisite: consent of instructor, enrollment at the UC Davis campus, for freshman and sophomore students. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience exposes lower division students to health care delivery, patient histories, physical examinations, health promotion, disease prevention, diagnosis; treatment of episodic, acute, chronic illness; appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Hitzeman, Smith

Upper Division Courses

192C. Primary Care Clinics (1-2)
Clinical activity—6-8 hours; seminar—2 hours; lecture—1-2 hours. Prerequisite: consent of instructor, enrollment at the UC Davis campus, upper-division standing. Students must apply and interview with the Board of Clinica Tepati or Imani Clinic. Field experience introduces students to health care delivery, patient histories and physical examinations, health promotions and disease prevention, diagnosis and treatment of episodic, acute and chronic illness, basic laboratory testing and appropriate referral and follow-up. May be repeated for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Hitzeman

195. Health Care to Underserved Populations (1)
Lecture—1 hour. Prerequisite: sociology, political science, or applied behavioral science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved populations in California impacting their health; roles of family/interpersonal relationships in making health care decisions; and clinician's perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. (P/NP grading only.)—II. (II.) Nesbitt

Graduate Courses

The following courses are for students enrolled in the Family Nurse Practitioner (FNP) program.

240A-240B-240C-240D-240E-240F. Clinical Preceptorship (1-13)
Clinical activity—9-36 hours. Prerequisite: enrollment in the Master's Track of the FNP Certificate Program, and successful completion of each preceding 240A-F section. Diagnosis and treatment of patients of all ages in an ambulatory care setting, under the supervision of a preceptor. May be repeated two times for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Long

242A-242B. Clinical Role Seminar (1.5-1.5)
Seminar—1.5 hours. Prerequisite: course 240 concurrently and student in the Master's Track of the FNP certificate program. Accompanies course 240 and provides a small group forum for students to explore role development and clinical management issues based on nursing theories and research. (Deferred grading only, pending completion of sequence.)—I, II, III. (I, II, III.) DeAmicis, O'Rourkes

252A. Professional Role Development (1.5)
Lecture/discussion—1.5 hours. Prerequisite: enrollment in the Master's Track of the FNP Certificate Program. Provides opportunity to discover strategies for promoting role development and role satisfaction via discussion of pertinent issues, theory, and research. (Deferred grading only, pending completion of sequence.)—I, II, III, IV. (I, II, III, IV.) Hass

252B. Nurse Practitioner as Leader (1.5)
Lecture/discussion—1.5 hours. Prerequisite: course 252A and concurrent enrollment in Master's Track of the FNP Certificate Program. Study of advanced practice role of nurse practitioner. Overview of legal and regulatory issues, certification and malpractice liability issues. Includes critical analysis of theories, issues and research related to nurse practitioner role development and applied legislation through community involvement. (Deferred grading only, pending completion of sequence.)—I, II, III, IV. (I, II, III, IV.) Hass

264. Psychosocial Concepts and Issues in Primary Care (2)
Lecture/discussion—2 hours. Prerequisite: B.S. degree in nursing and enrollment in the Master's Track of the FNP Certificate Program. Introduces the principles of effective communication in establishing the therapeutic provider-patient relationship. Provides an examination of relevant psychosocial concepts and issues related to primary care. Research and theory are emphasized.—I, II, III, IV. Hass

266A. Health Maintenance/Promotion (2)
Lecture—2 hours. Prerequisite: B.S. degree in nursing and enrollment in the Master's Track of the FNP Certificate Program. Focuses on the health and wellness of individuals throughout the lifespan. Critical analyses of nursing interventions in health promotion and maintenance based on nursing and other theoretical frameworks and research data are emphasized.—I. (I.) DeAmicis

266B. Family Nursing Theory (1)
Lecture—1 hour. Prerequisite: enrolled in master's track of the FNP Certificate Program or consent of instructor. Exploration of family theories as related to advanced primary care nursing practices.—I, II, III. (I, II, III.) O'Rourke

266C. Family Nursing Interventions (2)
Lecture—2 hours. Prerequisite: course 266B and enrollment in the Master's Track of the FNP Certificate Program. Course integrates family theoretical and therapeutic concepts to focus on nursing assessment and intervention strategies for family problems in health and illness.—III. (III.) O'Rourke

266D. Community Assessment and Intervention (1)
Lecture—1 hour. Prerequisite: enrollment in the Master's Track of the FNP Certificate Program. The relationship between advanced primary care nursing practice and community is explored. Community assessment and intervention strategies appropriate for the family nurse practitioner are discussed. May be repeated two times for credit.—II. (II.) O'Rourke

290. Health Care to Rural and Urban Underserved Populations (1)
Lecture—1 hour. Prerequisite: Sociology, Political Science, or Applied Behavioral Science background recommended, or registration in Medical School. Discusses sociocultural perspectives of underserved populations impacting health; roles of family/interpersonal relationships in making health care decisions; the nature of ethnic/racial/socioeconomic health care disparities; and clinicians' perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. May be repeated for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Nesbitt

Professional Courses

The following courses are for students enrolled in the Family Nurse Practitioner/Physician Assistant (FNP/PA) Program.

300. Health Assessment for Advanced Practice (4.5)
Lecture/discussion—4.5 hours. Prerequisite: enrolled in the FNP/PA Certificate Program, or consent of instructor. Advanced concepts and skills in health and physical assessment essential to the clinical decision making and caring process for the FNP, PA or advance practice nurse. Emphasis on eliciting an accurate and thorough history and performing a physical examination.—I, II, III, IV. (I, II, III, IV.) O'Rourke

331A. Scientific Basis of Diseases—A (4)
Independent study—3 hours; lecture/discussion—1 hour. Prerequisite: registered student in the FNP/PA Certificate Program or consent of instructor. Anatomy, physiology and concepts of pathophysiology.—I, II, III, IV. (I, II, III, IV.) Milton

331B. Scientific Basis of Disease—B (1)
Independent study—0.5 hours; lecture/discussion—0.5 hours. Prerequisite: course 331A, registered student in the FNP/PA Certificate Program or consent of instructor. Neurological and renal diseases and abnormalities of adrenal function. Builds on concepts covered in prior coursework; Web-enhanced course.—I, II, III, IV. (I, II, III, IV.) Milton

340A. Clinical Preceptorship for FNP/PA Students (1-13)
Clinical activity—3-39 hours. Prerequisite: consent of instructor. Restricted to registered students in the Family Nurse Practitioner/Physician Assistant Program. Hands-on clinical experience including supervised patient care, development of clinical skills, assessment and management of patients in the medical ambulatory care setting. May be repeated two times for credit at instructor's recommendation. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Long

340B. Clinical Preceptorship for FNP/PA Students (1-13)
Clinical activity—3-39 hours. Prerequisite: consent of instructor. Restricted to registered students in the Family Nurse Practitioner/Physician Assistant Program. Hands-on clinical experience including supervised patient care, development of clinical skills, assessment and management of patients in the medical ambulatory care setting. May be repeated two times for credit at instructor's recommendation. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Long

340C. Clinical Preceptorship for FNP/PA Students (1-13)
Clinical activity—3-39 hours. Prerequisite: consent of instructor. Restricted to registered students in the Family Nurse Practitioner/Physician Assistant Program. Hands-on clinical experience including supervised patient care, development of clinical skills, assessment and management of patients in the medical ambulatory care setting. May be repeated two times for credit at instructor's recommendation. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Long

340D. Clinical Preceptorship for FNP/PA Students (1-13)
Clinical activity—3-39 hours. Prerequisite: consent of instructor. Restricted to registered students in the Family Nurse Practitioner/Physician Assistant Program. Hands-on clinical experience including supervised patient care, development of clinical skills,

assessment and management of patients in the medical ambulatory care setting. May be repeated two times for credit at instructor's recommendation. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Long

341A. Advanced Clinical Preceptorship for FNP/PA Students (1-13)

Clinical activity—3-39 hours. Prerequisite: consent of instructor; successful completion of course 340. Restricted to registered students in the Family Nurse Practitioner/Physician Assistant Program. Development of clinical skills learned in course 340 through an approved clinical preceptorship. Assess and manage common medical problems under supervision of preceptor. May be repeated two times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Long

341B. Advanced Clinical Preceptorship for FNP/PA Students (1-13)

Clinical activity—3-39 hours. Prerequisite: consent of instructor; successful completion of course 340. Restricted to registered students in the Family Nurse Practitioner/Physician Assistant Program. Development of clinical skills learned in course 340 through an approved clinical preceptorship. Assess and manage common medical problems under supervision of preceptor. May be repeated two times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Long

341C. Advanced Clinical Preceptorship for FNP/PA Students (1-13)

Clinical activity—3-39 hours. Prerequisite: consent of instructor; successful completion of course 340. Restricted to registered students in the Family Nurse Practitioner/Physician Assistant Program. Development of clinical skills learned in course 340 through an approved clinical preceptorship. Assess and manage common medical problems under supervision of preceptor. May be repeated two times for credit. ((S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Long

341D. Advanced Clinical Preceptorship for FNP/PA Students (1-13)

Clinical activity—3-39 hours. Prerequisite: consent of instructor; successful completion of course 340. Restricted to registered students in the Family Nurse Practitioner/Physician Assistant Program. Development of clinical skills learned in course 340 through an approved clinical preceptorship. Assess and manage common medical problems under supervision of preceptor. May be repeated two times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Long

344. Inpatient Surgical Experience for FNP/PA Students (3)

Clinical activity—9 hours. Prerequisite: Registration in the FNP/PA program. Course 340, 240A, 240B, 240C, 354A, 354B, 354C, or consent of instructor. Student clerkships in the inpatient setting in surgery at UCDMC and/or affiliated institutions. Designed to expose the students to inpatient management of surgical patients; acquaint student with FNP/PA role in surgical setting. May be repeated two times for credit (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III, IV. Long

346. Clinical Geriatrics (3)

Clinical activity—90 hours. Prerequisite: registered student in the FNP/PA program and successful completion of course 340A-340B-340C and 354A-354B-354C and 365A-365B-365C or consent of instructor. Application of principles of geriatric care in the outpatient, nursing home, acute hospitals and community settings that provide services for the elderly, including visits to patients' homes. (P/NP grading only; Deferred grading only, pending completion of sequence.)—I, II, III, IV. (I, II, III, IV.) Long

347. Inpatient Medical Experience for FNP/PA Students (4)

Clinical activity—12 hours. Prerequisite: Registration in the FNP/PA program. Course 340, 240A, 240B, 240C, 354A, 354B, 354C, or consent of instructor. Student clerkships in the inpatient setting in Family Practice at UCDMC and/or affiliated institutions. Designed to expose the students to inpatient management; acquaint student with FNP/PA role in the inpatient setting. May be repeated two times for credit. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III, IV. Long

350. Ethics and Trends in Health Care for FNP/PA Students (2)

Lecture/discussion—2 hours. Prerequisite: registered student in the FNP/PA Program. Trends and ethical issues in health care, review of the process and policies for ethical decisionmaking in patient care. These issues, trends, and processes will be related to the role of the Family Nurse Practitioner/Physician Assistant.—I. II, III, IV. (II.) Dehn

353. Geriatric Medicine for FNP/PA Students (1)

Lecture—1 hour. Prerequisite: registered student in the FNP/PA Program. Introduction to advanced concepts in geriatric medicine. Comprehensive assessment, decision making, and management of selected medical problems encountered in primary care. Appropriate consultation and referral are discussed. May be repeated two times for credit.—I, II, III, IV. (I, II, III, IV.) O'Rourke

354A-354B-354C. Fundamentals of Primary Health Care for FNP/PAs (3-8)

Lecture/discussion—2 hours; web virtual lecture—1 hour. Prerequisite: enrollment in the Family Nurse Practitioner/Physician Assistant Program. Restricted to students in the Family Nurse Practitioner/Physician Assistant Program only. Anatomy and physiology, pathophysiology, diagnostic criteria, approaches to assess and manage medical problems common in primary care. May be repeated two times for credit.—I, II, III, IV. (I, II, III, IV.) Hass, Milton, Slater

355A. Advanced Principles of Family Health Care (3-8)

Lecture/discussion—2 hours; web virtual lecture—1 hour. Prerequisite: enrollment in the Family Nurse Practitioner/Physician Assistant Program. Restricted to students in the Family Nurse Practitioner/Physician Assistant Program only. Management of infectious disease and reproductive problems in primary health care. Emphasis on comprehensive assessment, appropriate clinical decision making and management of selected medical problems commonly encountered in primary care settings, appropriate consultation and referral. May be repeated two times for credit.—I, II, III, IV. (I, II, III, IV.) DeAmicis

355B. Advanced Principles of Primary Health Care (5)

Lecture/discussion—5 hours. Prerequisite: registered student in the FNP/PA Program; successful completion of course 354A-354B-354C. Anatomy and physiology, pathophysiology, diagnostic criteria, approaches to assessment and management of patients with complex and/or multiple health care problems in primary care settings.—I, II, III, IV. (I, II, III, IV.) Milton

355C. Advanced Principles of Health Care for FNP/PA Students (4)

Lecture/discussion—4 hours. Prerequisite: registered student in the FNP/PA Program; course 354A-354B-354C. Study of anatomy and physiology, pathophysiology, diagnostic criteria and approaches to assess and manage patients with complex and/or multiple health care problems in primary care settings, and to learn the management of patients in inpatient settings. May be repeated for credit.—I, II, III, IV. (I, II, III, IV.) DeAmicis

355D. Advanced Principles of Health Care for FNP/PA Students (4)

Lecture/discussion—4 hours. Prerequisite: registered student in the FNP/PA Program; course 354A-354B-354C. Study of anatomy and physiology, pathophysiology, diagnostic criteria and approaches to assess and manage patients with complex and/or multiple health care problems in primary care settings, and to learn the management of patients in inpatient settings. May be repeated for credit.—I. (I.)

358A. Pharmacology (2)

Extensive problem solving—1 hour; tutorial—1 hour. Restricted to registered students in the Family Nurse Practitioner/Physician Assistant Program. Informs about core knowledge in pharmacokinetics and pharmacodynamics, autonomic nervous system principles, genetic variations, regulatory requirements, mechanism of action, adverse effects, contraindications and clinical therapeutics necessary to make rational and optimal therapeutic plans for patients in ambulatory settings. May be repeated two times for credit.—I, II, III, IV. (I, II, III, IV.) DeAmicis

358B. Pharmacology (2)

Extensive problem solving—1 hour; tutorial—1 hour. Restricted to registered students in the Family Nurse Practitioner/Physician Assistant Program. Provides core knowledge in pharmacology to include mechanism of action, dosages, adverse effects, contraindications and clinical therapeutics necessary to make rational and optimal therapeutic plans for patients in ambulatory settings. Specific organ systems (i.e., cardiovascular, gastrointestinal) are reviewed. May be repeated two times for credit.—I, II, III, IV. (I, II, III, IV.) DeAmicis

358C. Pharmacology (2)

Extensive problem solving—1 hour; tutorial—1 hour. Restricted to registered students in the Family Nurse Practitioner/Physician Assistant Program. Provides core knowledge in pharmacology to include mechanism of action, dosages, adverse effects, contraindications and clinical therapeutics necessary to make rational and optimal therapeutic plans for patients in ambulatory settings. Specific organ systems (i.e., cardiovascular, gastrointestinal) are reviewed. May be repeated two times for credit.—I, II, III, IV. (I, II, III, IV.) DeAmicis

361. Family Theory and Assessment (1)

Lecture—1 hour. Prerequisite: registered student in the FNP/PA Program. Examines the family using a family system framework within the context of its internal dynamics, relationship to community and cultural variations. May be repeated two times for credit.—I, II, III, IV. (II.) O'Rourke

367A. Family Practice and Community Health for FNP/PA Students (2)

Lecture/discussion—2 hours. Prerequisite: registered student in the FNP/PA Program. Examines pediatric and adolescent concepts of growth and development as related to primary health care. Primary health care issues and needs will be assessed in relationship to family and community. Health promotion and disease concepts. May be repeated two times for credit.—I, II, III, IV. (I, II, III, IV.) DeAmicis

367B. Family Practice and Community Health for FNP/PA Students (1)

Lecture/discussion—1 hour. Prerequisite: registered student in the FNP/PA Program. Examines concepts of adult growth and development as related to primary health care. Issues and needs of the adult are examined in relationship to family and community, health promotion, disease prevention and wellness concepts. May be repeated two times for credit.—I, II, III, IV. (I, II, III, IV.) O'Rourke

367C. Family Practice and Community Health for FNP/PA Students (1)

Lecture/discussion—1 hour. Prerequisite: registered student in the FNP/PA Program. Examines concepts of development in the elderly as related to primary health care. Health care issues and unique needs are presented with an emphasis on health promotion and disease prevention. May be repeated two times for credit.—I, II, III, IV. (I, II, III, IV.) O'Rourke

368A. Behavioral Science for FNP/PA Students (1)

Lecture/discussion—1 hour. Prerequisite: registered student in the FNP/PA Certificate Program or consent of instructor. Principles of effective communication in therapeutic provider-patient relationship. History taking techniques that foster empathy and respect. Biopsychosocial model of health care.—I, II, III, IV. (I, II, III, IV.) Stewart

368B. Behavioral Science (1)
Lecture/discussion—1 hour. Prerequisite: completion of course 368A and registered student in the Family Nurse Practitioner/Physician Assistant Program. Exploration into a variety of addictive behaviors within diverse populations. Utilization of clinical case studies to develop skills in the identification, interview and management of these patients and recognition of how these behaviors impact the family system.—I, II, III, IV. (I, II, III, IV.) Hass

368C. Behavioral Science (1)
Lecture/discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Multicultural perspectives of health. Traditional health, beliefs and healing practices of several California cultures.—I, II, III, IV. (I, II, III, IV.) Slater

368D. Behavioral Science for FNP/PA Students (1)
Lecture—1 hours. Prerequisite: registered student in the FNP/PA Program. Basic principles of assessment, counseling and treatment of individual patients, their families and support systems as they experience the effects of chronic illnesses, chronic pain, terminal diseases, death and grieving, Students are strongly encouraged to explore their coping styles. May be repeated two times for credit.—I, II, III, IV. (I, II, III, IV.) Stewart

370A-370B-370C-370D-370E-370F. Clinical Case Seminars for FNP/PA Students (1.5-1.5-1.5-1.5-1.5-1.5)
Seminar—1.5 hours. Prerequisite: registered student in the FNP/PA Program. Designed to increase critical thinking by utilizing the development and processing of the differential diagnoses of several cases based on the topics covered in the medicine course (course 354, 355) taught the same quarter. May be repeated two times for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Himmerick

372A. Professional Development for FNP/PA Students (1.5)
Lecture/discussion—1.5 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Understanding the Family Nurse Practitioner (FNP) and Physician Assistant (PA) roles, history of the profession and impact of FNP and PA on health care systems; critical review of medical literature including introduction to evidence based medicine and statistics; managed care. (Deferred grading only, pending completion of sequence.)—I, II, III, IV. (I, II, III, IV.) Milton

372B. Professional Development for FNP/PA Students (1.5)
Lecture/discussion—1.5 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program. Roles of the Family Nurse Practitioner (FNP) and Physician Assistant (PA) including legal and regulatory issues affecting practice, licensing requirements, elements of negotiating a job, legislative and political awareness, and community involvement. (Deferred grading only, pending completion of sequence.)—I, II, III, IV. (I, II, III, IV.) Hass

390. Health Care of the Western Farmworkers (2)
Independent study—1.2 hours; clinical activity—2.4 hours. Prerequisite: Enrollment in the Family Nurse Practitioner/Physician Assistant Program. Basic concepts for providing primary health care to migrant and seasonal agricultural workers. (P/NP grading only; deferred grading only, pending completion of sequence.)—I, II, III, IV. (I, II, III, IV.) DeAmicis

399. Special Study (1-12)
Prerequisite: enrolled in the FNP/PA Certificate Program or consent of instructor. Research and clinical interests to enhance education in family practice. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Dehn

Professional Courses

401. Introductory Preceptorship in Family Practice (3-9)
Clinical activity—20-40 hours. Prerequisite: completion of first year of medical training. Preceptorship in family practice offered as an introduction to clinical medicine. 20 hours or 40 hours per week in a family physician's office, doing patient interviews, history-taking, and performing physical exams. (H/P/F grading only.)—III, IV. (III, IV.) Eidson-Ton

405. The Healer's Art (1)
Lecture—0.6 hours; workshop—3 hours. Prerequisite: consent of instructor. Limited to first-year medical students. Learning to strengthen your humanity and remain open-hearted can make the difference between professional burnout and a fulfilling life. Opportunity to learn tools for self care, healing loss, finding meaning, strengthening commitment and becoming a true physician. (P/F grading only.)—II, III. (II, III.) Eidson-Ton, Neyhart

411. Selected Studies of Systems for Chronic Illness Care (3)
Clinical activity—4 hours; discussion—4 hours. Prerequisite: course 400A, 400B, 400C, medical students with consent of instructor. Understanding of chronic illness, particularly diabetes, participation in patient care, alternative techniques. May be repeated one time for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Fong

430. Primary Care Clerkship (12)
Clinical activity—45 hours; lecture—2 hours; workshop—2 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Eight week primary care clerkship for third year medical students. Four week primary care experience with an additional four weeks in Internal Medicine clinics. (H/P/F grading only.)—I, II, III, IV. Eidson-Ton

434. Primary Care Clinics-Clínica Tepati (3-12)
Clinical activity—32-36 hours; seminar—0-2 hours; lecture—1-2 hours. Open to medical students in all four years of medical school. Medical students will learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Hitzeman

435. Primary Care Clinics-Imani Clinic (3-12)
Clinical activity—32-36 hours; seminar—0-2 hours; lecture—1-2 hours. Open to medical students in all four years of medical school. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Smith

436. Continuity Clinic in Primary Care—Shifa Clinic (3-12)
Clinical activity—32-36 hours; seminar—0-2 hours; lecture—1-2 hours. Open to medical students in all four years of medical school. Learn counseling, diagnosis and treatment of patients with chronic and acute disease under supervision of physician. Provides exposure to special health care needs of various ethnic and poverty-level populations. May be repeated for credit. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Yasmeen

444. Advanced Preceptorship in Family Medicine (3-18)
Clinical activity—40 hours. Prerequisite: completion of third-year primary care plus clerkship or consent of instructor. Preceptorships with primary care physicians in a variety of settings. Acquisition skills to evaluate and develop a treatment plan for patients with common medical problems seen by primary care physicians in an out patient setting. May be repeated up to 18 units of credit. (H/P/F grading only.)—I, II, III, IV. Eidson-Ton

460. Geriatrics in Community Health (3-6)
Fieldwork—24 hours; clinical activity—12 hours; lecture—4 hours. Prerequisite: course 430. Visits to community agencies including mental health teams, adult day health centers, a diagnostic and research center, and case management specialists. Observation and participation in MMSE's, patient-family conferences, interdisciplinary team meetings, neuropsychiatric testing and home visit evaluations. (H/P/F grading only.)—I, II, III, IV. Neyhart

468. International Preceptorship (3-12)
Clinical activity—40 hours. Prerequisite: medical student with consent of instructor. Preceptorship with a family practitioner in a foreign country (arranged by student contact or with assistance of the Family and Community Medicine Department.) Participate in clinical activities, analyze and report characteristics of the practice. May be repeated up to 12 units of credit. (H/P/F grading only.)—I, II, III, IV.

469. Clerkship in Family Practice Residency (3-12)
Clinical activity—40 hours. Prerequisite: completion of third year of medical school or consent of instructor. Comprehensive primary medical care of patients in a family practice hospital or residency. Usually includes inpatient and outpatient experience. May be repeated up to 12 units of credit. (H/P/F grading only.)—I, II, III, IV.

488. Selected Studies in Family Practice (1-9)
Prerequisite: medical students with consent of instructor. Assigned readings in family practice to increase understanding on selected topics relating to family medicine and primary health care delivery; visits to and written analysis of selected health care programs; and/or exposure to family practice with a community physician preceptor who is a member of the clinical faculty. May be repeated up to 9 units of credit.—I, II, III, IV.

490. Health Care to Rural and Underserved Populations (1)
Lecture—1 hours. Prerequisite: Sociology, Political Science, or Applied Behavioral Science background recommended, or registration in medical school. Discusses sociocultural perspectives of underserved populations impacting health; roles of family/interpersonal relationships in making health care decisions; the nature of ethnic/racial/socioeconomic health care disparities; and clinicians' perspectives in treating people of cultures which are unfamiliar and/or uncomfortable with Western medicine. May be repeated for credit. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Hilty, Nesbitt

498. Directed Group Study (1-5)
Variable—3-15 hours. Explore in-depth various topics in primary care. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Garcia, Lerant

499. Research (1-12)
Prerequisite: medical students with consent of instructor. Research in various aspects of the health care delivery system. (H/P/F grading only.)

Human Physiology (HPH)

Lower Division Course

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor.
(P/NP grading only.)

Upper Division Courses

192. Internship in Human Physiology (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in physiology and related fields. (P/NP grading only.)

198. Directed Group Study (1-5)
To be arranged. Prerequisite: consent of instructor. Directed reading, discussion and/or laboratory experience on selected topics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Laboratory—3-15 hours; undergraduate research project. Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. (P/NP grading only.)

Graduate Courses

210A. Advanced Physiology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Physiology Ph.D. program, or consent of instructor. Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology. (Same course as Physiology 210A.)—I. (I.) Cala, Payne

298. Group Study (1-5)
Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

400. Human Physiology (6)
Lecture—3 hours; laboratory—2 hours. Prerequisite: consent of Committee on Student Progress. Medical student only. General and cellular physiology of neurons, muscle, and epithelial cells and systemic physiology of cardiovascular, respiratory, gastrointestinal, and renal systems. (Deferred grading only, pending completion of sequence.) (P/F grading only.)—I, IV. (I, IV.) O'Donnell, Payne

403. Medical Neuroanatomy (5)
Lecture—3 hours; laboratory—1 hours; discussion/laboratory—1 hour. Prerequisite: Successful completion of course 400, block 1; restricted to medical students only. Anatomy of the normal human nervous system, to include gross external and internal morphology of brain and spinal cord, and function neuroanatomy of motor, sensory and cognitive systems. Incorporates application of neuroanatomy to clinical problem solving. (Same course as Cell Biology and Human Anatomy 403.) (P/F grading only.)—IV. (IV.) Blankenship, Gross

493. Physiological Principles in SICU SSM (6)
Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor; restricted to UC Davis School of Medicine students only. Special Study Module, a four week course on the topic: Care of the Critically Ill Surgical Patient: Use of Physiological Principles to Guide Treatment of Patients with Common Surgical Problems. (Same course as Surgery 493C.) (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Cala, Holcroft

497T. Tutoring in Human Physiology (1-5)
Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.)—Cala

498. Directed Reading and Group Study (1-4)
Discussion—2-8 hours. Prerequisite: medical student. Directed reading and discussion on selected topics in human physiology. (H/P/F grading only.)

499. Research (1-6)
Prerequisite: medical students with consent of instructor. Laboratory investigation on selected topics. (H/P/F grading only.)

Internal Medicine (IMD)

Lower Division Courses

92. Internship (1-4)
Internship—3-12 hours. Prerequisite: lower division standing and consent of instructor. Supervised internship in internal medicine and related fields. (P/NP grading only.)—Last

98. Directed Group Study (1-2)
Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Directed group study in medicine and related fields. (P/NP grading only.)—Last

99. Undergraduate Research in Medicine: Molecular and Cell Biology (1-3)
Prerequisite: consent of instructor. (P/NP grading only.)—Last

Upper Division Courses

192. Internship in Internal Medicine (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing. Supervised work experience in internal medicine and related fields. (P/NP grading only.)

194. Practicum in Community Health Clinics (1-3)
Clinical activity—5-15 hours on Saturday mornings and during the week as necessary, excluding holidays. Prerequisite: consent of instructor. The undergraduate student, through active participation in the medical aspects of community health clinics, gains knowledge of the organization, administration, and problem-solving capabilities of these primary care facilities. May be repeated for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Kumagai

198. Directed Group Study (1-2)
Seminar—1-2 hours. Prerequisite: consent of instructor. Directed group study in medicine and related fields. (P/NP grading only.)—Last

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

Graduate Courses

214. Topics in Medical Ethics (1)
Seminar—1 hour. The complex moral, legal, and ethical dilemmas that patients, families, and health care providers face in today's clinics. May be repeated one time for credit. (S/U grading only.)—I.

220D. Cardiovascular System (2.5)
Lecture/discussion—5.5 hours. Prerequisite: Human Physiology 200, graduate student status and consent of instructor. Principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system. Included are ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders.—II. (II.) Laslett

250. Medicine and the Law (3)
Lecture/discussion—2 hours; project—2 hours. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. (S/U grading only.)—II. Rich

290C. Controversies in Clinical Research (1)
Seminar—3 hours. Clinical Research Study design and data analysis related to controversial research areas. Presentations assigned to and given by faculty/student teams. May be repeated for credit. (S/U grading only.)—III. (III.) Lane, Meyers

Professional Courses

405. Metabolism, Endocrinology, Reproduction and Nutrition (9.5)
Lecture—3.8 hours; discussion/laboratory—2.8 hours. Prerequisite: consent of instructor; medical students only. Basic and pathophysiologic processes involved in human metabolic and nutritional regulation and in reproductive and endocrine control systems across the lifespan. Integrate information across these systems and use clinical reasoning process to identify and understand relevant perturbations and diseases. (Same course as Biological Chemistry 405, Human Physiology 405, Obstetrics and Gynecology 405) (Deferred grading only, pending completion of sequence. P/F grading only.)—II, III. (II, III.) Sweeney, Towner, Turgeon

420. Hematology (2)
Lecture/discussion—1 hour; discussion—1.5 hours. Prerequisite: consent of instructor. Restricted to Medical student only. Normal hematopoiesis and basic disorders of blood cells, immunoglobulin disorders, thrombosis and hemostasis. Normal and abnormal blood cells and the interpretation of common laboratory tests. (Deferred grading only, pending completion of sequence.) (P/F grading only.)—IV. (IV.) O'Donnell

420A. Hematology (2)
Lecture/discussion—1 hour; discussion—1 hour. Prerequisite: consent of instructor. Restricted to Medical student only. Malignant disorders of blood cells and transfusion therapy. Covers acute leukemia, myelodysplasia, myeloproliferative disorders, lymphoma, and myeloma. (Deferred grading only, pending completion of sequence.) (P/F grading only.)—I. (I.) O'Donnell

420B. Gastrointestinal System (2.5)
Lecture—2 hours; discussion—2 hours. Prerequisite: approval of Committee on Student Progress; medical student only. Basic pathophysiologic principles of digestive diseases on which clinical concepts and judgments can be developed. Emphasis on pathophysiologic basis of gastroenterological and hepatic disorders with discussion of major disorders and their diagnosis and management. (P/F grading only.)—II. (II.) Terrado

420C. Pulmonary and Critical Care Medicine (2.5)
Laboratory/discussion—5.5 hours. Prerequisite: approval of Committee on Student Progress. Clinical aspects of respiratory anatomy, physiology, and pathology. Diagnostic procedures and a description of the major pulmonary diseases and disorders, and critical care medicine. (P/F grading only.)—II. Stollenwerk

420D. Cardiovascular System (2.5)
Lecture/discussion—5.5 hours. Prerequisite: approval of the School of Medicine Committee on Student Progress. Principles of etiology, mechanisms, diagnosis and management of the major diseases of the cardiovascular system. Included are ischemic, valvular, hypertensive, cardiomyopathic, pericardial, and electrical disorders. (P/F grading only.)—II. Venugopal

420E. Nephrology (2)
Lecture—2 hours; discussion—2 hours; laboratory—2 hours. Prerequisite: approval of Student Progress Committee. Fundamental aspects of disorders of body water, electrolytes and acid/base balance; major categories and mechanisms of parenchymal renal diseases; urinary tract infections. (P/F grading only.)—II. Yeun

430. Medicine Clerkship (12)
Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Clerkship is divided into two, four-week blocks, one each at UCDMC and at Kaiser Hospitals. Time is spent in direct patient care situations under the guidance of faculty. On-going patient write-ups, rounds, conferences are required. (H/P/F grading only.)—I, II, III, IV. Prescott

450A. Medicine and the Law (1.5)
Seminar—2 hours; discussion—2 hours. Prerequisite(s): consent of instructor. Restricted to Medical students only. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. Offered irregularly. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—II. (II.) Rich

450B. Medicine and the Law (1.5)
Seminar—2 hours; discussion—2 hours. Prerequisite(s): consent of instructor. Restricted to Medical students only. Legal and bioethical principles and concepts in medicine. Topics include standard of care, informed consent, reproductive medicine, and end-of-life issues. Offered irregularly. (Deferred grading only, pending completion of sequence. H/P/F grading only.)—III. (III.) Rich

459. Oncology: Research and Treatment of Cancer (2)
Lecture/discussion—2 hours. Prerequisite: second-, third-, or fourth-year medical student and/or consent of instructor. Comprehensive review of current treat-

ment practices of cancer and state-of-the-art research impacting treatment and prevention of cancer. Emphasis on epidemiology, molecular biology, and pharmacology. (H/P/F grading only.)—I. (I.) DeGreggio

460. Correctional Health Care Clerkship (1-4)
Clinical activity—full time. Prerequisite: fourth-year medical student in good academic standing. Covers Correctional Health delivery and the effects of detention and incarceration on health status. Special emphasis on problems unique to health care delivery in a prison setting. Student will spend time in clinical settings at three prison facilities. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Silva

462. Externship in Medicine (6)
Clinical activity—40 hours. Prerequisite(s): Medical Sciences 431; consent of Instructor; demonstrated ability to accept responsibility. Limited enrollment. Assume role of acting intern and be primary physician on medical ward under direction of medical resident and staff. Teams I-V take call every fifth night. Emphasis on evidence-based inpatient care. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Henderson

463. Acting Internship in Medicine Intensive Care Unit (MICU) (6)
Clinical activity—40 hours. Prerequisite: completion of third year in medical school; consent of Director of MICU. Limited enrollment. At UCDMC, student functions as acting intern on MICU service under direction of medical resident and staff. Responsibility for patients admitted to MICU. On call in hospital every fourth night. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Albertson

464. Bayanihan Primary Care Clinic (3)
Clinical activity—6 hours. Prerequisite: consent of instructor. Restricted to medical students in all four years of medical school. Under the guidance and supervision of a physician, medical students will learn patient history taking, medical documentation, counseling, diagnosis and treatment of patients with chronic and acute disease. Provides exposure to the special needs of various ethnic and socioeconomic groups. May be repeated for credit. (P/F grading only.)—I, II, III, IV. (I, II, III. IV.) Guerrero

465. Medicos-Global Health Sciences (9)
Lecture—5 hours; clinical activity—25 hours; fieldwork—5 hours; project—5 hours. Prerequisite: consent of instructor; medical students only. Travel to foreign country for four weeks to collaborate with faculty from local universities and work in urban and rural environments, including hands-on experience with clinic patients. Cultural exchange and awareness of global health care. (P/F grading only.)—IV. (IV.) Wilkes

470. Landmark Clinical Trials and Evidence-Based Medicine (3)
Lecture/discussion—10 hours; clinical activity—8 hours. Prerequisite: fourth-year medical student. Ten landmark clinical trials from a historical, clinical, and epidemiological/research perspective. Principals of evidence-based medicine. (H/P/F grading only.)—III. Kravitz, Amsterdam

480. Person Centered Assessment (1)
Lecture—1 hour. Prerequisite: open to all medical students. Person-centered assessment modalities and diagnostic approaches with regards to Internal Medicine and its different subspecialties. (P/F grading only.)—I. Fitzgerald

494. Practicum in Community Health Clinics (1-3)
Clinical activity—15-40 hours. Prerequisite: medical student with consent of instructor. Students are assigned to clinical settings that demonstrate ethnic, urban/rural, or other related aspects of clinical community health. Through active participation in health care delivery, students are able to relate conceptual with practical aspects of primary health care. May be repeated for credit. (H/P/F grading only.)—I, II, III. (I, II, III.) Kumagai

497. Medicine, Bioethics and the Holocaust (3)
Lecture/discussion—10 hours. Prerequisite: medical students only, consent of instructor. The concept of "evil" and the role of collaborators, bystanders and participants exemplified by the holocaust and compared to problems physicians face in practice today. Demonstration that evil emerges incrementally until taken for granted. (P/F grading only.) Not offered every year.—I, II, III.

498. Group Study in Internal Medicine (1-18)
Prerequisite: consent of instructor. Special study for medical students which may involve laboratory or library research, ambulatory or inpatient care responsibility on campus, at UCDMC or off campus by specific arrangement. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

499. General Medicine Research (1-18)
Independent study—20 hours. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Meyers

Internal Medicine—Cardiology (CAR)

Upper Division Courses

192. Internship in Cardiology (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in cardiology. May be repeated for credit up to 12 units. (P/NP grading only.)

199. Cardiology Research (1-5)
Prerequisite: consent of instructor. Special study by individual arrangement in cardiovascular medicine. Work will include directed readings, laboratory and discussions. (P/NP grading only.)

Graduate Courses

220. Basic Science in Cardiology (1)
Lecture—1 hour. Prerequisite: graduate or medical student status. Fundamentals underlying cardiovascular medicine. Including hemodynamics, neural control of the circulation, biochemistry and some experimental design and statistics. Experts in each of these fields will give current information in their areas. Offered in alternate years. (S/U grading only.)—III. Kaufman

299. Cardiology Research (2-3.5)
Prerequisite: consent of instructor. Research or special studies. (S/U grading only.)—Bonham, Longhurst

Professional Courses

401. Clinical Cardiology Clerkship: Kaiser (3-18)
Clinical activity (4 weeks)—8-12 hours (hospital); 1-5 hours (clinics). Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology. Emphasis placed on history taking and physical examination of pediatric and adult patients with congenital and acquired cardiovascular disease. Hospital rounds in CCU and elsewhere. The roles of ECG, PCG, and cardiac fluoroscopy, etc., in office cardiology will be evaluated. May be repeated for credit. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

460. Cardiology Clinical Clerkship (3-18)
Clinical activity—full time (2-12 weeks). Prerequisite: Internal Medicine 430, third- and fourth-year medical students in good academic standing with consent of instructor. Participation with members of subspecialty consultation service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiologic disorders. Two outpatient clinics per week. May be repeated for credit. Limited enrollment. (H/P/F grading only.)—I, II, III, IV.

461. Management of Coronary Artery Disease: Coronary Care Unit (3-18)
Clinical activity (inpatient service)—full time (4 weeks). Prerequisite: completion of second year of medical school and advance approval by Division of Cardiology. Research in laboratory and exercise testing to be determined by instructor. Current methods of clinical research involving certain aspects of diagnosis and treatment. Includes acute coronary care, hemodynamic monitoring, stress testing, cardiac catheterization, pathologic correlations and the modern approach to therapy, both medical and surgical, based on pathophysiologic mechanisms. May be repeated for credit. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

464. Preventive Cardiology (3-6)
Seminar—2 hours (for 2-4 weeks); clinical activity—full time (2-4 weeks). Prerequisite: completion of third year of medical school. Clinical experience, weekly seminar and reading on primary and secondary prevention of cardiovascular disease. Will be carried out in Lipid and Hypertension Clinics, Exercise Laboratory, Cardiac Care Unit, Cardiac Catheterization, and Cardiac Surgery services. (H/P/F grading only.)—II, III, IV. (II, III, IV.) Amsterdam

480. Insights in Cardiology (1-3)
Clinical activity—3-9 hours. Prerequisite: medical student in good academic standing and approval by Division of Cardiology. Students attend one or more cardiovascular medicine clinics: general, hypertension, arrhythmia. Introduction to the diagnosis/treatment of common cardiovascular problems. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

493. Gender Specific Medicine SSM (6)
Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor; restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course on the topic: Basic Science Principles Relating to Gender Specific Medicine. (Same course as Obstetrics & Gynecology 493.) (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Sweet, Villablanca

498. Special Group Study: EKG Unit (1-12)
Special study—2-week sessions. Prerequisite: medical students with advance approval by monthly attending faculty. Special group study in cardiology for medical students in EKG unit. May include lectures, directed reading, and/or discussion groups. May be repeated for credit. Limited enrollment. (H/P/F grading only.)

499. Research (1-12)
Prerequisite: approval by Division of Cardiology. (H/P/F grading only.)

Internal Medicine—Endocrinology, Diabetes and Metabolism (ENM)

Upper Division Course

192. Internship in Endocrinology (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in endocrinology. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

299. Research (1-12)
Prerequisite: consent of instructor. Endocrinology research. (S/U grading only.)

Professional Courses

460. Endocrinology Clinical Clerkship (3-18)
Clinical activity (inpatient-outpatient service)—full time (3 days per unit). Prerequisite: Internal Medicine 430 and/or consent of instructor. Participation with members of subspecialty service in the initial evaluation, work-up, management and follow-up of patients with endocrinologic disorders. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

480. Insights in Endocrinology (1-3)
Clinical activity—3-9 hours; oral presentation. Prerequisite: student in good academic standing and consent of instructor. First- or second-year students observe in morning Endocrine and Diabetes clinics and attend bi-weekly noon and afternoon endocrine

conferences. They also give brief endocrine physiology oral presentation to the endocrine group. (H/P/F grading only).—I, II, III, IV. (I, II, III, IV.)

499. Research (1-12)
Prerequisite: consent of instructor. (H/P/F grading only.)

Internal Medicine—Gastroenterology (GAS)

Upper Division Course

192. Internship in Gastroenterology (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in gastroenterology. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

299. Research (1-12)
Research in gastroenterology. (S/U grading only.)—Bowlus

Professional Courses

460. Clinical Clerkship (3-18)
Clinical activity—full time (2 to 12 weeks). Prerequisite: completion of third year of medical school. Work-up, manage, and follow-up new patients on active inpatient consulting service. Gastroenterology/Hepatology patients. Daily rounds with attending physician. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

480. Insights in Gastroenterology (1-3)
Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. To gain insight in clinical activities of Gastroenterology Division through attendance at any of the following: endoscopic procedures, ward rounds, outpatient clinic, and G.I. grand rounds. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Leung, Hsu

499. Research (1-12)
Clinical activity—varied. Prerequisite: medical student status; consent of instructor. Part-time participation in active clinical and basic research projects. Some will involve both patient care and relevant laboratory procedures. Basic research includes liver metabolism, cancer markers, porphyrias diet and cancer, folate metabolism. May be repeated for credit. (H/P/F grading only.)—Leung, Bowlus, Pimstone, Prindiville

Internal Medicine—General Medicine (GMD)

Upper Division Course

192. Internship in General Medicine (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in general medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

291. Seminars in Human Health Services Research and Clinical Epidemiology (1)
Seminar—1 hour. Critical review, evaluation, and discussion of research in health services and clinical epidemiology. Presentation of statistical, epidemiologic, and econometric methods. Students present their own research and critique the work of others. May be repeated for credit. (Same course as Epidemiology 291.) (S/U grading only.)—I, II, III. (I, II, III.)

Professional Courses

460. General Medicine Consults (1-18)
Clinical activity (inpatient-outpatient service)—40 hours. Prerequisite: fourth-year medical students with consent of instructor; a general medicine clerkship. Supervised opportunity to see entire spectrum of medical problems encountered by a general internist. Student spends time in General Medicine Clinic and on the General Medicine Consult Service. Consultation Service is particularly concerned with medical evaluation of surgical patients. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) White, Robbins, Hirsch, Kravitz, Bach, Hogarth, Melenderes, Fancher, Garcia, Mitchell, Keenan, Newell, Romano

470. Health Care Ethics (3-9)
Discussion and conference—full time (2-6 weeks). Prerequisite: consent of instructor. Guided independent study of issues in biomedical ethics, with discussion of readings that are based on student interests and needs. Student participation in ethics rounds. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Loewy

485. Introduction to Health Care Ethics (1)
Lecture—10 weeks. Prerequisite: medical student in good standing. Introduction to concepts and methods of healthcare ethics. Emphasis on problems and methods. (H/P/F grading only.)—I. (I.) Loewy

493A. Teaching the Basic Sciences SSM (6)
Lectrue—6 hours; lecture/laboratory—8 hours; laboratory—30 hours; tutorial—10 hours. Prerequisite: consent on instructor; concurrent registration in Medical Sciences 440. Restricted to UC Davis School of Medicine students only. Special Studies Module, a yearlong in progress court to teach lecture and discussion education technique and theory. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Stevenson

499. General Medicine Research (1-18)
Discussion—3 hours; clinical research—8-40 hours. Prerequisite: consent of instructor. Student will be involved in a clinical research problem within the areas, interest and expertise of members of Division of General Internal Medicine. Alternatively, the research effort will be directed toward investigation of a clinical problem of general medical interest. May be repeated for credit. (H/P/F grading only.)

Internal Medicine—Hematology-Oncology (HON)

Upper Division Course

199. Research in Hematology–Oncology (1-5)
Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

Graduate Courses

298. Topics in Hematology (1-4)
Prerequisite: one year of graduate work and/or consent of instructor. Basic concepts of the physiology of the hematopoietic organ, the pathophysiology of hematopoietic disease, and concepts of therapeutics will be offered for study. The specific topics to be dictated by the interest and background of the students.

299. Research (1-12)
Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

Professional Courses

420. Oncology (2)
Lecture—1 hour. Prerequisite: consent of instructor. Restricted to Medical student only. Covers the principles of oncology and the pathophysiology of specific, common cancers correlated with organ systems pathophysiology and systemic pathology courses. (Deferred grading only, pending completion of sequence.) (P/F grading only.)—I. (I.) Welborn

420A. Oncology (2)
Lecture—1 hour. Prerequisite: consent of instructor. Restricted to Medical student only. Covers the principles of oncology and the pathophysiology of specific, common cancers correlated with organ systems pathophysiology and systemic pathology courses. (Deferred grading only, pending completion of sequence.) (P/F grading only.)—II. (II.) Welborn

460. Hematology–Oncology Acting Internship (6-18)
Clinical activity—full time (4-12 weeks). Prerequisite: fourth-year medical student in good academic standing. Acting intern on inpatient hematology/oncology ward service. May be repeated for credit. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

461. Hematology–Oncology Consult Clerkship (6-12)
Clinical activity—full time (4-8 weeks). Prerequisite: fourth-year medical student in good academic standing. Student is an integral member of the inpatient hematology and oncology consult service, the bone marrow service, and will attend all conferences sponsored by the Division. May be repeated for credit. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

462. Hematology–Oncology Ambulatory Clerkship (6-18)
Clinical activity (inpatient/outpatient service)—full time (4 weeks). Prerequisite: fourth-year medical student in good academic standing. Outpatient rotations in related clinics. Participation with members of the subspecialty service in the initial clinical evaluation, work-up, management and follow-up of the patient with hematologic or oncologic disorders. May be repeated for credit. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

493. Ethical, Legal and Social Issues in Clinical Genetics (6)
Seminar—10 hours; clinical activity—14 hours; autotutorial—6 hours; independent study—10 hours. Prerequisite: consent on instructor; UC Davis School of Medicine students only. This module will cover cancer as a process, beginning with risks and prevention, preneoplasia, microinvasion, treatment options, metastases and systemic therapy, pain medicine and palliative care, and cancer communication. The format includes traditional lectures, student-led case discussions, and problem-based learning. (H/P/F grading only.)—III. (III.) Meyer, von Friederichs Fitzwater

499. Research (1-12)
Prerequisite: consent of instructor. (H/P/F grading only.)

Internal Medicine—Infectious Diseases (IDI)

Upper Division Courses

141. Infectious Diseases of Humans (1)
Lecture—1 hour. Prerequisite: introductory knowledge in biology and chemistry recommended. Course integrates information on biological and molecular nature of the causative organism, modern diagnostics, treatment and prevention strategies, and the role of infectious diseases in contemporary society and throughout human history. (P/NP grading only.)—I. (I.) Danekar

192. Research Internship in Internal Medicine (1-12)
Internship—3-36 hours; final report. Supervised work experience in the division of Infectious Diseases. Undergraduates will have an opportunity to acquire research experience in clinical settings. May be repeated for credit up to 12 units. (P/NP grading only.)

199. Infectious Diseases Research (1-5)
Prerequisite: chemistry through organic chemistry (in addition, physical and biochemistry preferred), biology through basic bacteriology (in addition, microbiology and immunology preferred); and consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results will be reviewed at intervals with instructor and via seminar presentation. (P/NP grading only.)

Graduate Courses

211. Epidemiology and Prevention of Infectious Diseases (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Epidemiology 205B, 207 or Internal Medicine 421. Infectious disease epidemiology and prevention, with equal emphasis on human and veterinary diseases. Major categories of infectious diseases by mode of transmission.—III. DeRiemer, Sandrock

299. Research in Infectious Diseases (1-12)
Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

Professional Courses

440. Introduction to AIDS and Related Disorders (1.5-6)
Clinical Activity—30 hours; discussion—10 hours. Prerequisite: first and second year medical students must be in good academic standing and have consent from the instructor. Familiarizes students with the diagnosis and treatment of individuals infected with the human immunodeficiency virus. Students will interview patients, observe patient care and participate in ongoing clinic research as well as examine alternative lifestyles. May be repeated for credit. (H/P/F grading only.)—I, II, IV.

450. Clinical and Social Care of the Injection Drug User (1-4)
Lecture—1 hour; clinical activity—3 hours. Prerequisite: first and second year medical students in good academic standing. Lecture and guided clinical practice in a supervised clinical setting, focusing on the social and medical aspects of health care for injection drug users. May be repeated for credit up to 24 units. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

460. Infectious Diseases Clinical Clerkship (3-6)
Clinical activity. Prerequisite: successful completion of two years of study in an accredited medical school. Limited enrollment with priority to fourth-year medical students. Patients ill with infectious diseases, including AIDS, will be evaluated and presented at rounds and case conferences. Patients are also seen in the Infectious Diseases Clinic. Instruction in clinical microbiology and the proper use of the laboratory will be provided. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Cohen

499. Research Topics in Infectious Disease (2-12)
Prerequisite: successful completion of the first year of study in School of Medicine, graduate students (approved for graduate credit), and/or consent of instructor. Discrete problem requiring reading and actual manual effort in solution will be assigned to each student. Progress and results to be reviewed at intervals with instructor and via seminar presentation. (H/P/F grading only.)

Internal Medicine—Nephrology (NEP)

Upper Division Course

192. Internship in Nephrology (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in nephrology. May be repeated for credit up to 12 units. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

Graduate Course

299. Nephrology Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

444. Curriculum Design for Doctoring (1)
Project—2 hours; seminar—1 hour. Prerequisite: consent of instructor; second year standing in medical school. Design of Doctoring curriculum for medical students in focused topic areas to be announced annually. Students will design sessions, consider resource needs, and work with IORs to initiate the curriculum. (P/F grading only.)—IV. (IV.)

460. Nephrology and Fluid Balance (3-6)
Clinical activity—4 hours; lecture/discussion—10 hours. Prerequisite: completion of 3rd year medical school and medicine core clerkship, consent of instructor. Active participation in all inpatient/outpatient clinical activities, attendance at specific lectures and conferences at UC Davis Medical Center covering the field of nephrology and fluid-electrolyte disorders. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. Chin, Kaysen

499. Research in Nephrology (3-18)
Prerequisite: individual arrangement and consent of instructor. Independent laboratory research on a specific problem related to biochemical or immunologic causes of renal disease and/or uremic disorders in humans or animals. (H/P/F grading only.)—Kaysen

Internal Medicine—Pulmonary Medicine (PUL)

Upper Division Course

192. Internship in Pulmonary Medicine (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in pulmonary medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

Graduate Course

299. Pulmonary Disease Research (1-12)
Laboratory. Prerequisite: by arrangement only. Pulmonary disease research activity with focus in inhalation toxicity, oxidants or lung biochemistry, and cell and molecular biology. (S/U grading only.)—Cross

Professional Courses

460. Pulmonary and Critical Care Medicine Clinical Clerkship (6-18)
Clinical activity—full time (4-12 weeks). Prerequisite: Medical Sciences 431. At UC Davis Medical Center participating and rounding with Pulmonary/Critical Care Medicine fellows and consultation staff. Also includes pulmonary function test interpretation, outpatient assignments in outpatient clinic and preparation and presentation of material at weekly conferences. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

462. Pulmonary Clinical Clerkship (3-12)
Clinical activity—full time (2-8 weeks). Prerequisite: completion of second year of medical school and/or consent of instructor. Participation at the Sacramento VA clinic with members of the subspecialty service in initial clinical evaluation, workup, management, and follow-up of patients with pulmonary disorders. Includes experience in Pulmonary Function Laboratory, and pulmonary diagnostic processes. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Bonekat

480. Pulmonary-Critical Care Medicine Insights (1-3)
Clinical activity—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Student will attend respiratory outpatient clinics and in-patient pulmonary consultation rounds and medical intensive care rounds. Introduction to diagnosis and treatment of common pulmonary problems. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Albertson

499. Research (1-12)
Prerequisite: consent of instructor. (H/P/F grading only.)

Internal Medicine—Rheumatology-Allergy (RAL)

Lower Division Course

99. Directed Research in Immunology (1-5)
Laboratory. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Gershwin

Upper Division Courses

192. Internship in Rheumatology-Allergy (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work experience in rheumatology-allergy. May be repeated for credit up to 12 units. (P/NP grading only.)

199. Directed Research in Immunology (1-5)
Laboratory. Prerequisite: consent of instructor. Independent research will be encouraged in basic immunology, including the role of the cellular immune system in oncogenesis. (P/NP grading only.)—Gershwin

Graduate Courses

209. Current Topics in Immunology: From Presentations to Grants (3)
Lecture—1 hour; term paper or discussion—1 hour; project—1 hour. Prerequisite: Immunology 201. Current developments in various aspects of immunology and their interrelationships. Focus on areas of immunology not currently covered in the basic and advanced immunology courses. Oral presentation, written review and grant preparation.—II. (II.) Van de Water

298. Topics in Rheumatology and Clinical Immunology (1-5)
Laboratory. Prerequisite: consent of instructor. Library and/or laboratory work as required. (S/U grading only.)—Gershwin

299. Research in Autoimmune Disease (1-12)
Laboratory. Prerequisite: consent of instructor. Independent research will be encouraged in both animal models of human disease (including congenitally athymic [nude], asplenic, and New Zealand mice) and the cellular immune system of patients with systemic lupus erythematosus, Sjögren's syndrome, polymyositis and drug hypersensitivity. (S/U grading only.)—Gershwin

Professional Courses

460. Rheumatology Clinical Clerkship (1-18)
Clinical activity—2-40 hours. Prerequisite: Medical Sciences 431 and consent of instructor. Participation with members of the subspecialty service in the diagnosis and therapeutic management of patients with rheumatologic diseases. May be repeated for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

461. Allergy Clinical Clerkship (3-18)
Clinical activity (inpatient-outpatient service)—full time (2 to 12 weeks). Prerequisite: completion of second year of medical school and consent of instructor. Student will work with practicing allergist in daily work with patients and participate in weekly allergy clinic and teaching conferences. Study of the literature. Will see patients with problems in clinical immunology, immunodeficiency, asthma, allergic rhinitis. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

470. Practicum in Care of the Terminally Ill (3-6)
Clinical activity—35 hours; seminar—5 hours. Prerequisite: consent of instructor. Restricted to fourth-year Medical students in good standing. Work with hospice interdisciplinary team. Direct experience in the care of patients with illnesses where no cure is possible. Emphasis on symptom relief, end of life issues, physician assisted suicide. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) McMillian

480. Insights in Rheumatology (1-3)
Clinical activity—3–9 hours. Prerequisite: student in good academic standing and consent of instructor. Participation in rheumatology consultation rounds, rheumatic disease clinics and conferences with supervised readings in rheumatology. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Leek

499. Research (1-12)
Prerequisite: medical student with consent of instructor. Part-time participation in active clinical and basic research projects which can involve both patient care and relevant laboratory procedures. Students can gain experience in clinical medicine and clinical investigation. May be repeated for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

Medical Microbiology

Lower Division Courses

10. Parasitic Disease in Humans (2)
Lecture—2 hours. Introduction to parasitic diseases in humans, including relationships between humans and parasites, symptoms, diagnosis, geographical distribution, treatment and prevention of parasitic disease. Not offered every year.—III.

Upper Division Courses

115. Ecological Parasitology (3)
Lecture—3 hours. Parasitism as a life style is explored from the ecological point of view, illustrating the way parasites utilize biotic habitats and the influence climate, geography, behavior, cultural change and alteration of habitat can have on the distribution and prevalence of parasites.—II. (II.)

116. Parasitology for Wildlife Biologists (3)
Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Emphasis on the role infectious diseases play in wildlife dynamics. Lectures and demonstrations on techniques and methods for examining wild animals for evidence of infectious diseases, methods used in preserving and identifying parasites of wildlife, as well as what is known about their pathogenesis.—III. (III.)

130. Medical Mycology (2)
Lecture—2 hours. Prerequisite: a course in pathogenic microbiology and consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in alternate years. (Same course as 430.)—II. Pappagianis

188. Human Immunology (3)
Lecture—3 hours. Prerequisite: undergraduate level introductory biology course. Human immune system and mechanisms of immunity. Basic components and function of immune system. Molecular basis of immune response; basic cellular and molecular mechanisms. Interactions between cells of immune system producing immune responses; regulating molecules.—II. (II.) Torres

192. Internship in Medical Microbiology (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in medical microbiology and related fields. (P/NP grading only.)—I. II, III. (I, II, III.)

194H. Senior Honors Project in Medical Microbiology and Immunology (5)
Independent study—15 hours. Prerequisite: course 199 and consent of instructor. Project in research related to immunology of medically important viruses. Development of a hypothesis-driven project, performance of experimental protocols and preparation of graphical representation of original data. Requires oral and written presentation of research results. May be repeated three times for credit with consent of instructor. (P/NP grading only.)—I, II, III. (I, II, III.) Torres

198. Group Study in Medical Microbiology (1-5)
Prerequisite: upper division standing and consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (P/NP grading only.)

199. Research in Medical Microbiology (1-5)
Prerequisite: upper division standing and consent of instructor. Individual research. (P/NP grading only.)

Graduate Courses

200D. Mechanisms for Microbial Interactions with Hosts (3)
Lecture/discussion—3 hours. Prerequisite: Microbiology 200A or consent of instructor. Study of mechanisms involved in microbial interactions within a host environment. The following principles are basic to understanding these interactions: host recognition, invasion, competition and growth, and host defense.—II. (II.) Baumler, Beaman

210. Animal Models of Infectious Disease Journal Club (1)
Lecture/discussion—1 hour. Prerequisite): students funded by the Animal Models of Infectious Diseases Training Grant; others by consent of instructor. Research articles in current literature. Topics/articles to include a broad range of frontiers in animal models of human infectious diseases. Limited enrollment. May be repeated for credit. (S/U grading only.)—II. (II.) Solnick

215. Medical Parasitology (3)
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: graduate student with consent of instructor. Epidemiology, pathogenesis, diagnostic methods and current literature discussion of protozoa, helminths and arthropods of medical importance.—III. (III.) Dawson, Luckhart

280. Molecular Pathobiology for Diagnosis and Therapy of Human and Animal Diseases (3)
Lecture—3 hours. Prerequisite: graduate standing. Molecular pathobiology of phenotypes caused by human hereditary diseases and viruses. Emphasis on molecular diagnostics at cellular/tissue level, and therapy including vaccines and gene transfer using recombinant DNA technology. Not open for credit to students who have completed Internal Medicine: Infectious Diseases 280.—III. (III.) Tsolis

291. Seminar in Microbiology and Immunology (1)
Seminar—1 hour. Restricted to students with upper division or graduate standing. Research seminars on current topics in microbiology and immunology. May be repeated for credit if topic differs. (S/U grading only.)—I, II, III. (I, II, III.) Dandekar, Torres

298. Group Study in Medical Microbiology and Immunology (1-5)
Prerequisite: consent of instructor; open to graduate students. Directed reading and discussion and/or laboratory investigation on selected topics. (Sections 1, 2, 4, 5: S/U grading only.)

299. Research (1-12)
Prerequisite: consent of instructor; open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

Professional Courses

410. Physician Scientist Molecular Medicine Journal Club (1)
Lecture—1 hour. Weekly seminars by students on research articles in current literature. Topics/articles to be selected by instructors to include a broad range of frontiers in biomedical literature. May be repeated for credit. (H/P/F grading only.)—I. (I.) Bevins

430. Medical Mycology (2)
Lecture—2 hours. Prerequisite: a course in pathogenic microbiology and consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in alternate years. (Same course as 130.) (H/P/F grading only.)—II. Pappagianis

480A. Medical Immunology (2.5)
Lecture—2 hours; laboratory/discussion—.5 hours. Prerequisite: approval of Committee on Student Progress; medical students only. This course helps students understand the immune system, the nomenclature and functional significance of the tissues, cells, proteins and genes of the immune system, as well as the normal regulatory mechanisms and pathologic outcomes related to the immune response. (Deferred grading only, pending completion of sequence. P/F grading only.)—II, III. (II, III.) Shacklett, Torres

480B. Pathogenic Microbiology (5.5)
Lecture—2.75 hours; laboratory/discussion—1 hour. Prerequisite: approval of the School of Medicine Committee on Student Progress; medical students only. Discussion of the diseases caused by infectious agents includes their pathogenesis, clinical manifestations, diagnosis, treatment epidemiology and prevention. The course will cover the general properties of and diagnostic techniques for bacteria, fungi and viruses. (Deferred grading only, pending completion of sequence. P/F grading only.)—II, III. (II, III.) Luckhart, Mudryj, Tsolis

497T. Tutoring in Medical Microbiology (1-5)
Tutoring—3-15 hours. Prerequisite: appropriate preparation in subject matter and consent of instructor. Assist instructor by tutoring medical students in one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.)

498. Group Study in Medical Microbiology and Immunology (1-5)
Prerequisite: medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.)

499. Research (1-12)
Prerequisite: medical students with consent of instructor. (H/P/F grading only.)

Master of Public Health (MPH)

Graduate Course

Please see Public Health Sciences (SPH), on page 406.

210. Public Health Informatics (1)
Lecture—2 hours. Collection, verification, and utilization of data related to populations; infrastructure, functions, and tools used to generate public health knowledge supporting public health practices and policy development/dissemination. (S/U grading only.)—Hogarth, Doebbert

Medical Pharmacology and Toxicology (PHA)

Lower Division Courses

92. Internship in Pharmacology (1-12)
Internship—3-36 hours; final report. Prerequisite: lower division student with good academic standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: lower division standing. (P/NP grading only.)

Upper Division Courses

192. Internship in Pharmacology (1-12)
Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in pharmacology and related fields. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

225. Gene Therapy (2)
Lecture/discussion—2 hours. Prerequisite: Genetics 201C/Molecular and Cellular Biology 221C or equivalent. Gene therapy from basic concepts to clinical applications. Topics include the human

genome and genetic variation, genetic diseases, methods to manipulate gene expression, viral and non-viral delivery vectors, history and progress of gene therapy, case studies, and ethical issues. Offered in alternate years.—II. Segal

250. Functional Genomics: From Bench to Bedside (2)

Lecture/discussion—2 hours. Prerequisite: consent of instructor. Functional genomics (gene regulation, microarrays, proteomics), with an emphasis on clinical relevance and applications. Topics include cancer therapeutics, gene therapy, and biomarker discovery.—III. (III.) Farnham

291. Pharmacology Research Seminar Series (1)

Seminar—1 hour; discussion—1 hour. Prerequisite: consent of instructor; upper division or graduate standing. Research seminars on current topics in Pharmacology. May be repeated for credit when topic differs. (S/U grading only.)—I, II, III. (I, II, III.) Wulff

298. Group Study (1-5)

Prerequisite: consent of instructor.

299. Research (1-12)

Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

400A. Pharmacology (2)

Lecture—1 hour; discussion/laboratory—0.3 hours. Prerequisite: approval by School of Medicine Committee on Student Progress; medical students only. Principles in pharmacology, including pharmacokinetics, drug metabolism and the actions, uses and toxicities of the major classes of drugs. (Deferred grading only, pending completion of sequence. P/F grading only.)—II, III. (II, III.) Gelli, Wulff

400B. Pharmacology (1.5)

Lecture—1 hour; discussion—.25 hours. Prerequisite: approval by the School of Medicine Committee on Student Progress; medical students only. Principles in pharmacology, including autonomic pharmacology, general anesthetics, neuropharmacology and sedative/hypnotics. (P/F grading only.)—IV. (IV.) Diaz

400C. Pharmacology (1.5)

Lecture—1 hour; discussion—.25 hours. Prerequisite: approval by the School of Medicine Committee on Student Progress; medical student only. Topics taught include the treatment of respiratory and cardiovascular disease. Specific topics include: asthma, chronic obstructive pulmonary disease, hypertension, congestive heart failure, and the treatment of arrhythmias. (P/F grading only.)—I. (I.) Segal

400D. Pharmacology (2)

Lecture—3 hours. Prerequisite: approval by the School of Medicine Committee on Student Progress; medical student only. Pharmacology topics covered include central nervous system drugs, GI drugs, toxicology/poisoning and cancer chemotherapy. Specific topics are: cancer chemotherapy, pain management, the treatment of depression and psychosis, acid reflux disease, irritable bowel syndrome, and general toxicology. (P/F grading only.)—II. (II.) Segal

445. Introduction to Integrative Medicine (1)

Lecture/discussion—1 hour. Prerequisite: medical student in good standing. Basic principles of alternative medical systems (e.g., traditional Chinese, Ayurvedic, Tibetan), alternative practices (e.g., chiropractic, osteopathy, naturopathy, homeopathy, herbalism, guided imagery/meditation, massage therapy), and mind/body connection are presented as introduction to integrating alternative treatments into traditional medicinal practice. (H/P/F grading only.)—II. (II.) Diaz

490. Seminar in Pharmacology for Medical Students (1)

Seminar—1 hour. Prerequisite: consent of instructor. Seminar in pharmacology for medical students. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

497T. Tutoring in Pharmacology (1-5)

Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.)

498. Special Study for Medical Students (1-5)

Lecture, directed reading, and/or discussion groups—3-15 hours. Prerequisite: consent of instructor. Special study in pharmacology for medical students. (H/P/F grading only.)

499. Directed Research for Medical Students (1-12)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Directed research in pharmacology for medical students. (H/P/F grading only.)

Neurology (NEU)

Upper Division Course

199. Individual Special Study and Research (1-4)

Prerequisite: consent of instructor. Individual special study in neurophysiology and biomedical engineering is offered to qualified students. Studies on psychophysics, single-unit electrophysiology and instrumentation are offered in Davis. (P/NP grading only.)

Graduate Courses

298. Group Study (1-5)

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved. (S/U grading only.)

299. Individual Special Study and Research (1-12)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Individual special study and research in Neurophysiology and Biomedical engineering is offered at both Davis and Sacramento Medical Center. (S/U grading only.)

Professional Courses

420. Clinical Neurosciences (2)

Lecture/discussion—1 hour; lecture—1.5 hours. Prerequisite: medical students only. Pathophysiology underlying neurological disorders, including disorders of development, muscle, nerve, cerebral circulation, metabolism, myelin, cortical function, movement, cerebrospinal fluid, autonomic function and special senses. Anatomical basis of clinical testing, nervous system infection, neoplasia and trauma. (P/F grading only.)—IV. (IV.) Wheelock

450. Clinical Neurology Clerkship (6)

Clinical activity—24 hours; conference—12 hours; seminar—4 hours; independent study—10 hours. Prerequisite: fourth-year medical student or third-year medical student with consent of instructor. Critical elements of neurological clinical skills (history & exam) and basic and clinical neurological concepts expected for general residency preparation. Active, didactic, experiential and independent learning to encourage maturation of general professional competencies. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Wheelock

452. Advanced Clinical Neurology (6)

Clinical activity—full time (4 weeks). Prerequisite: completion of four-week Neurology selective and consent of instructor. Extension of basic Neurology clerkship. Designed for students with special interest in medical disorders of nervous system. By arrangement with department, student may serve as an acting intern. Principles of neurological differential diagnosis and therapeutics emphasized. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

455. Child Neurology (6)

Clinical activity—full time (4 weeks). Prerequisite: satisfactory completion of Internal Medicine 430, Obstetrics and Gynecology 430, Pediatrics 430 and consent of instructor. Student exposed to children with disorders of the nervous system, both in outpatient and inpatient services. Cases presented to a member of full-time faculty who will discuss clinical findings, differential diagnosis, management and therapy. This course satisfies the fourth year neuroscience requirement. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

498NE. Group Study in Neurology (1-6)

Prerequisite: medical students with consent of instructor. Directed readings and discussions with a comprehensive written examination at the end of course. (P/F grading only.)—I, II, III, IV.

499. Research (1-12)

Laboratory—2-24 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Laboratory investigation on selected topics. (H/P/F grading only for graduate and medical students.)

Neurosurgery (NSU)

Upper Division Course

199. Special Study in Neurosurgery for Advanced Undergraduates (1-5)

Prerequisite: advanced undergraduate standing with consent of instructor. Students may participate in ongoing neurosurgical projects or may pursue and design independent projects. (P/NP grading only.)

Graduate Course

299. Neurosurgery Research (3-12)

Prerequisite: graduate student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (S/U grading only.)

Professional Courses

451. Neurosurgical Critical Care Clerkship (3)

Clinical activity—full time (2 weeks). Prerequisite: third- or fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Students participate in the care of neurosurgical patients in the NSICU and in the admission and surgical management of patients admitted through the Emergency Room. (H/P/F grading only.)—I, II, III. (I, II, III.)

455. Clinical Pediatric Neurosurgery (6)

Clinical activity—full time (4 weeks). Prerequisite: third- or fourth-year medical students who have satisfactorily completed course 460; consent of instructor. Admission and follow-up of pediatric patients. Neurological history, examination, and diagnostic procedures are emphasized. Students will participate in surgical procedures and are required to attend all pediatric neurosurgery conferences. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Pang

460. Clinical Neurosurgery (6-18)

Clinical activity—full time (3 days per unit; 4 weeks minimum). Prerequisite: third- and fourth-year medical students; consent of instructor. Approved for graduate degree credit. Admission and follow-up of patients. Neurological history, examination and further diagnostic procedures emphasized. Students participate in meaningful aspects of surgical procedures and attend listed conferences, rounds, and seminars. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

464. Externship (6-18)

Clinical activity—full time (4-12 weeks). Prerequisite: fourth-year medical student having completed a neurosurgical clerkship or consent of instructor. Clerkship in neurosurgery to be arranged at another institution with accredited residency program in neurosurgery under proper supervision. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

470. Advanced Clinical Neurosurgery (6-18)

Clinical activity—full time (4-12 weeks). Prerequisite: fourth-year medical student in good academic standing. Student will function as acting intern on neurosurgery service. Admission and management of patients. Neurological history, examination, diagnostic procedures, and surgical management are emphasized. Students participate in meaningful

aspects of surgical procedures and attend required conferences and rounds. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

480. Insights in Neurosurgery (1-3)
Clinical activity—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Observation of neurosurgical care in emergency room, operating room and hospital floors, including manner of treatment of a variety of chronic and acute neurological diseases. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

499. Neurosurgery Research (1-18)
Prerequisite: medical student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (H/P/F grading only.)

Obstetrics and Gynecology (OBG)

Upper Division Courses

192. Shifa Clinic/Student Volunteer (1)
Conference—2 hours; clinical activity—6-8 hours; discussion—1-2 hours. Supervised work experience in obstetrics and gynecology. May be repeated up to 3 times for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Yasmeen

194. Shifa Clinic Student Volunteer (1)
Conference—1 hours; clinical activity—6 hours. Prerequisite: consent of instructor; the applications will be available for students. Selection of students will be made by selection committee of medical students coordinators and the IOR. Attend clinic every third Sunday performing duties of receptionist, intake, translation, monitor. Students attend a meeting immediately after end of clinic. There is a mandatory Monday meeting with Clinic co-directors. Students are expected to participate on various committees. May be repeated three times for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Yasmeen

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

220. Genetics of Reproduction (3)
Lecture/discussion—3 hours. Introduction to genetics of mammalian reproduction for domestic species, species used in research, and the human. Mendelian and non-Mendelian modes of inheritance. Research paper. Offered in alternate years.—II. (II.) Towner

290. Current Topics in Research (1)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Selected topics in reproductive biology. (S/U grading only.)—I, II, III, IV. (I, II, III, IV)

298. Group Study (1-5)
Prerequisite: graduate standing; consent of instructor.

299. Research (1-12)
Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

Professional Courses

405. Metabolism, Endocrinology, Reproduction and Nutrition (9.5)
Lecture—3.8 hours; discussion/laboratory—2.8 hours. Prerequisite: consent of instructor; medical students only. Basic and pathophysiologic processes involved in human metabolic and nutritional regulation and in reproductive and endocrine control systems across the lifespan. Integrate information across these systems and use clinical reasoning process to identify and understand relevant perturbations and diseases. (Same course as Biological Chemistry 405, Internal Medicine 405, Human Physiology 405) (Deferred grading only, pending completion of sequence. P/F grading only.)—II, III. (II, III.) Sweeney, Towner, Turgeon

420. Genetics and Reproduction (2)
Lecture—3 hours; conference—2 hours. Prerequisite: approval of Committee on Student Progress. Restricted to Medical students only. Introduction to medical genetics and the clinical consequences of genetic abnormalities. (P/F grading only.)—I. (I.) Towner

430. Obstetrics and Gynecology Clerkship (12)
Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Obstetrics, gynecologic and gynecological oncology experience in the delivery room, operating room, clinics and wards at UCDMC and affiliated sites. Rounds, conferences, interactive student presentations and seminars ongoing. (H/P/F grading only.)—I, II, III, IV. Dalrymple

460. Away Clinical Elective in OBGYN (3-18)
Clinical activity—30 hours. Prerequisite: third- or fourth-year medical student; course 430 or the equivalent; consent of instructor. Active participation in inpatient and/our outpatient care. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Dalrymple

465. Away Acting Internship in OBGYN (3-18)
Clinical activity—40 hours. Prerequisite: satisfactory completion of course 430 and other third-year core clerkships; consent of instructor. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Students are expected to provide direct patient management. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Dalrymple

470. Gynecologic Oncology Acting Internship (3-18)
Clinical activity—40 hours. Prerequisite: satisfactory completion of course 430 and the third-year core clerkships; consent of instructor. Four week elective primarily involves direct inpatient management of women on the UCDMC Gyn/Onc service. Students will be acting at the level of a sub-intern and will work under the supervision of house staff, fellows, and attendings. May be repeated up to 99 units for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Dalrymple

471. Ambulatory Gynecology and Obstetrics (6-8)
Clinical activity—full time (4-6 weeks). Prerequisite: third- and fourth-year medical students who have completed course 430; consent of instructor. Student to participate in following clinics each week: General Gynecology, New and Return Obstetrics, Post-Partum, High-Risk Obstetrics, Pre-Operative Clinic, other specialty clinics as assigned. Student will conduct examinations, present patients to staff and will be able to discuss treatment regimens. Night call in Labor and Delivery Suite every third night. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

475. Labor & Delivery Acting Internship (3-18)
Clinical activity—40 hours. Prerequisite: satisfactory completion of course 430 and the third-year core clerkships; consent of instructor. Four week elective primarily involves direct inpatient management of women on the UCDMC L&D unit. Students will be acting at the level of a sub-intern and will work under the supervision of house staff, fellows, and attendings. May be repeated for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Dalrymple

480. The Birthing Process (1)
Lecture/discussion—1 hour. Open only to UC Davis medical students. Training to assist in the birthing process as a Doula. Topics not covered in the summer course. (S/U grading only.)—I. Dalrymple

493. Gender Specific Medicine SSM (6)
Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor; restricted to UC Davis School of Medicine students only. Special Studies Module, a four week course on the topic: Basic Science Principles Relating to Gender Specific Medicine. (Same course as Cardiology 493.) (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Sweet, Villablanca

494. Shifa Clinic (6)
Clinical activity—8 hours. Prerequisite: medical student in good standing; restricted to medical student only. Interaction with patients from multiple ethnic and cultural backgrounds under the direct supervision of a physician/preceptor. Women's health issues and primary care issues in a diversely mixed population. May be repeated up to three times for credit. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Yasmeen

498. Group Study (1-5)
Prerequisite: consent of instructor. Explore particular topics in-depth in Obstetrics and Gynecology. Extensive contact with and oversight by instructor. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

499. Research in Obstetrics and Gynecology (2-12)
Clinical activity. Prerequisite: consent of instructor; fourth-year medical student. Research in Obstetrics and Gynecology arranged with instructor. May be repeated eight times for credit. (H/P/F grading only.)

Ophthalmology (OPT)

Upper Division Courses

192. Research Internship (1-12)
Internship—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in ophthalmology research. Research staff in Ophthalmology have programs in cell biology, electron microscopy, biochemistry, immunology and visual psychophysics. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Course

299. Basic Research in Visual Science (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

442. Introduction to Ophthalmology (3)
Clinical activity—40 hours. Prerequisite: third- or fourth-year Medical Student with consent of instructor; consent of advisor; completion of third-year clerkships in Medicine and Surgery; consult Course Coordinator. Ocular disease diagnosis and management relevant to the clinical practice of future primary care physicians and others. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Feiz

465. Advanced Subspecialty Ophthalmology (3-6)
Clinical activity—40 hours. Prerequisite: Medical students who have completed Internal Medicine 430 in third or fourth year; consent of instructor. Participation in disciplines of neuro-ophthalmology/pediatric ophthalmology, diseases of the cornea and external eye, glaucoma and retina. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Feiz

498. Group Study (1-3)
Prerequisite: medical students with consent of instructor. Directed reading and discussion. (H/P/F grading only.)

499. Research in Ophthalmology (1-12)
To be arranged—3-36 hours. Prerequisite: medical students with consent of instructor. Individual research on selected topics in optics and visual physiology, cornea and external disease. (H/P/F grading only.)

Orthopaedic Surgery (OSU)

Lower Division Course

99. Special Studies for Undergraduates (1-4)
Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

Professional Courses

421. The Musculoskeletal System (2.5)
Lecture/discussion—6 hours. Prerequisite: consent of Committee on Student Progress. Basic and clinical science of orthopaedic surgery and rheumatology. (P/F grading only.)—I. Fyhrie

428. Ambulatory and Emergency Room Orthopaedics (3-6)
Clinical activity—full time (2-4 weeks). Prerequisite: 4th-year medical student in good academic standing and consent of instructor. Introduction to general orthopaedic problems and trauma and their management in an outpatient environment, including the emergency room. Student will conduct orthopaedic examinations, present patients to staff rotating through trauma, hand, pediatrics, adult and foot clinics. Orthopaedic physical examination and interpretation of x-rays. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Yoo

462. Community Preceptorship (3-6)
Clinical activity—full time (2-4 weeks). Prerequisite: fourth-year medical student in good academic standing with consent of instructor. Acquaints student with private practice of orthopaedics in the community setting. Opportunity to observe and assist private practitioners in office, emergency room, operating room and inpatient environment. Student must provide own transportation. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Bovill, Yoo

464. Acting Internship (6)
Clinical activity—full time (4 weeks). Prerequisite: fourth-year medical student in good academic standing and consent of instructor. Rotation designed to increase basic knowledge of musculoskeletal abnormalities at clinical level. Attention focused on selective case material. For those students who demonstrate proficiency, responsibility will be similar to that of intern. Limited enrollment. May be repeated for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Yoo

480. Insights in Orthopaedic Surgery (1-3)
Clinical activity—3-9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Exposure to aims, methods and procedures in orthopaedic surgery via attendance at grand rounds, patient care conferences, and group discussions. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Szabo

481. History of Medicine for Medical Students (1.5)
Lecture/discussion—2.5 hours (for six weeks). Prerequisite: third- or fourth-year students in the School of Medicine or second-year students with consent of instructor. Overview of the history of medicine throughout the world to introduce medical students to landmark accomplishments and key figures in the development of health care and to provide an expanded philosophical perspective on the ever-changing field of modern medicine. (H/P/F grading only.)—I. (I.) Benson

499. Orthopaedics Research (1-12)
Clinical activity—3 hours to full time (to be arranged with individual faculty). Prerequisite: third- or fourth-year medical student in good academic standing; consent of instructor. Laboratory or clinical investigation on selected topics. May be repeated for credit. (H/P/F grading only.)

Otolaryngology (OTO)

Lower Division Courses

192. Internship in Otolaryngology (1-12)
Internship—3 to 36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in otolaryngology and related fields. Final project report. (P/NP grading only.)

199. Special Study in Otolaryngology for Advanced Undergraduates (1-5)
Prerequisite: advanced undergraduate with consent of instructor. (P/NP grading only.)—I, II, III, IV. Vasquez

Graduate Courses

290C. Research Conference in Otolaryngology (1)
Lecture/discussion—1 hour. Prerequisite: graduate students; medical students; advanced undergraduates with consent of instructor. Presentation and discussion of faculty and student research in otolaryngology. (S/U grading only.)—I, II. (I, II.)

291. Principles of Speech, Hearing and Equilibrium (3)
Lecture/discussion—3 hours. Prerequisite: graduate students; medical students; advanced undergraduates with consent of instructor. Presentations by faculty and guest lecturers on anatomy, physiology, and behaviors involved in speech production, hearing, and equilibrium. Each student will be expected to make one class presentation.—(I, II, III, IV.) Leonard

299. Individual Study in Otolaryngology for Advanced Graduate Students (1-12)
Prerequisite: advanced graduate student with consent of instructor. (S/U grading only.)

Professional Courses

403. Basic Principles of Reconstructive Surgery (1)
Lecture—four 2-hour sessions; laboratory—one 2-hour session (4 weeks). Prerequisite: third- or fourth-year medical student with consent of instructor. Formal presentations covering basic principles of reconstructive surgery, including wound healing, treatment of lacerations, skin and bone grafts, flaps, Z-plasties and revision of scars. Laboratory session utilizing animal tissues.—II. (II.) Donald

440. Otolaryngology Required Clerkship (3)
Clinical activity—full time (2 weeks). Prerequisite: consent by Committee on Student Evaluation and Promotion. To provide fundamental knowledge of otorhinolaryngologic diagnosis and principles, develop facility with basic ENT instruments, provide an understanding of treatment for ear, nose and throat problems and provide knowledge of what patients should be referred for otorhinolaryngologic care.—I. (I, II, III, IV.) Diaz

450. Fourth Year Otolaryngology Elective (6)
Clinical activity—35 hours; lecture—2 hours; film-viewing—0.25 hours; discussion—1 hour. Prerequisite: third- or fourth-year medical student; consent of instructor. Participation in Otolaryngology Clinic and operating room. Evaluation and management of common Otolaryngologic diseases. (H/P/F grading only.)—(I, II, III, IV.) Diaz

460. Clinical Otolaryngology Elective (3-18)
Clinical activity—full time. Prerequisite: third- and fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Total involvement in clinical activities of the department. (H/P/F grading only.)—(I, II, III, IV.) Diaz

490. Journal Seminar (1)
Lecture/discussion—10 hours total (course given three times per quarter). Prerequisite: fourth-year medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Monthly review of current otolaryngologic and related literature and recent advances. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Donald

498. Individual or Group Study (1-5)
Lecture/discussion—1-2 hours; laboratory—1-4 hours. Prerequisite: consent of instructor. Introduction to basic research in Otolaryngology. Lectures, discussion and laboratory study of sensory and motor systems. (H/P/F grading only.) Diaz

499. Research (1-12)
Prerequisite: medical students with consent of instructor; open to graduate students. Approved for graduate degree credit. Participation in ongoing projects. (H/P/F grading only.) Brodie

Pathology (PMD)

Upper Division Courses

192. Internship in Human Pathology (1-12)
Internship—3-36 hours; final project report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in pathology and related fields. (P/NP grading only.)

199. Special Study in Pathology for Advanced Undergraduates (1-5)
Prerequisite: advanced undergraduates and consent of instructor. (P/NP grading only.)

Graduate Courses

290C. Research Group Conferences (1)
Seminar—1 hour. Prerequisite: graduate level standing. Seminar. Topics on animal models of human disease and infectious diseases. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

298. Advanced Group Study (1-5)
Prerequisite: consent of instructor.

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

405. Brain Cutting Conference (1-4)
Seminar—1-4 hours. Prerequisite: third- and fourth-year medical students or consent of instructor. Current specimens are sectioned, discussed, and clinical correlations proposed. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Ellis

407. Advanced Neuropathology (1-12)
Discussion and laboratory. Prerequisite: consent of instructor. Study of pathologic reaction in human central and peripheral nervous systems and skeletal muscle by microscopic, light and electron microscopic examination of current and archival material. Discussions of clinical correlations and current medical literature. Individualized experience in neuropathologic techniques. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Ellis

410A. General and Endocrine Pathology (2.5)
Lecture—4 hours; laboratory/discussion—4.5 hours. Prerequisite: approval of Committee on Student Progress. Restricted to Medical students only. Pathologic mechanisms of human disease. Concepts of general pathologic processes, i.e., cell death, inflammation and neoplasia. Endocrine pathology in the context of clinical human disease. Emphasis on integration of clinical practice with gross and histologic images. (P/F grading only.)—III. (III.) Gandour-Edwards, Jensen

410B. Systemic Pathology (1)
Lecture—1 hours; laboratory/discussion—0.5 hours. Prerequisite: Approval by SOM Committee on Student Progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with an emphasis on integration with clinical medicine. Topics include hematopathology and neuropathology. (Deferred grading only, pending completion of sequence. P/F grading only.)—IV. (IV.) Gandour-Edwards, Jensen

410C. Systemic Pathology (2)
Lecture—1 hour; discussion—2 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with an emphasis on integration with clinical medi-

cine. Topics include pulmonary pathology, cardiovascular pathology, hematopatology, oncologic pathology, and nephropathology. (Deferred grading only, pending completion of sequence. P/F grading only.)—I. (I.) Gandour-Edwards, Jensen

410D. Systemic Pathology (2.5)
Lecture—1 hour; discussion—2 hours. Prerequisite: approval by SOM Committee on Student Progress. Restricted to Medical students only. Anatomic and clinical pathology of organ system human disease with emphasis on integration with clinical medicine. Course content parallels concurrent clinical courses with integration of lectures and discussions. Topics include gastrointestinal and gynecologic pathology, hepatopathology, oncologic pathology and musculoskeletal pathology. (Deferred grading only, pending completion of sequence. P/F grading only.)—II. (II.) Gandour-Edwards, Jensen

464. Anatomic Pathology (3-6)
Clinical activity—40 hours. Prerequisite: fourth-year Medical Students with consent of instructor. Restricted to Medical Students only. Anatomic pathology with an emphasis on autopsy and surgical pathology with application to clinical practice. Specimen grossing, frozen sections, microscopic sign-out and conferences. Exposure to cytopathology, hematopathology, and clinical pathology is available. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Gandour-Edwards

465. Applied Clinical Laboratory Medicine (6-9)
Prerequisite: consent of instructor. Emphasis upon laboratory techniques, procedures, and interpretation of laboratory results. Students will be expected to participate fully and in all laboratory operations including bench techniques, laboratory management, and quality control. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Kost

474. Anatomic Pathology Acting Internship (6)
Clinical activity—40-80 hours. Prerequisite: fourth-year medical student or consent of instructor. Restricted to medical students only. Anatomic Pathology AI will permit students to gain skills needed for first year Pathology Residency. Students will perform autopsies and take full responsibility for a variety of surgical pathology cases. A mix of outpatient and inpatient cases is expected. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Gandour-Edwards

493. Interdisciplinary Study of Gastrointestinal Cancer (6)
Lecture—5 hours; clinical activity—12 hours; laboratory—3 hours; discussion/laboratory—20 hours. Prerequisite: consent of instructor. In-depth study of gastrointestinal, hepatic and pancreatic cancer. Emphasis on an integration of basic science and clinical medicine. Participating departments include pathology, surgical oncology, medical oncology, gastroenterology, radiology and radiotherapy. (Same Course as Surgery 493D.) (H/P/F grading only.)—II, III. (II, III.) Khatri, Ruebner, Saroufeem

497T. Tutoring in Pathology (1-5)
Tutoring—3-15 hours. Prerequisite: advanced standing or consent of instructor. Assist instructor by tutoring medical students in preparation for one of the departmental courses that is a component of the required curriculum of the School of Medicine. (H/P/F grading only.)

498. Advanced Group Study (1-5)
Prerequisite: medical student and consent of instructor. Group study in variety of advanced topics in general, special, experimental, or comparative pathology. (H/P/F grading only.)

499. Research (1-18)
Prerequisite: medical student with consent of instructor. Research in experimental, molecular, comparative, and applied pathology. Limited enrollment. (H/P/F grading only.)

Pediatrics (PED)

Upper Division Course

199. Special Study in Pediatric Research (1-5)
Prerequisite: undergraduate student with consent of instructor based upon adequate preparation as determined by instructor. (P/NP grading only.)

Graduate Course

299. Pediatric Research (1-12)
Prerequisite: graduate students who are candidates for a degree in some area of biology or behavioral sciences; consent of instructor. (S/U grading only.)

Professional Courses

401. Preceptorship in Pediatrics (2)
Preceptorship—half time. Prerequisite: second-year medical student or first-year medical student with consent of instructor. Opportunity to observe and participate in primary medical care in a practicing pediatrician's office. Participation in history-taking and physical examination will be at discretion of preceptor and dependent on student's experience. Evaluation by student. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

402. Clinical Experience in Private Practice (1-18)
Clinical activity—full time (2 to 12 weeks). Prerequisite: third-or fourth-year medical student; course 430; consent of preceptor and Chairperson. Opportunity to participate in practice of preceptor, performing such tasks as history taking, physical examination, and patient management. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

430. Pediatric Clerkship (12)
Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Eight week clinical clerkship providing students with the opportunity to learn fundamentals of caring for the pediatric patient by participating in nursery, ambulatory and inpatient services at UCDMC and affiliated clinical sites. Rounds, conferences, student presentations ongoing. (H/P/F grading only.)—I, II, III, IV. Wold

460A. Acting Internship: General Inpatient Pediatric Clerkship (6-18)
Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of course 430 with grade of B or better; letter of recommendation from Pediatrics faculty member. The Ward Acting Intern functions in a manner similar to that of a pediatric intern. The Acting Intern takes admissions in the regular sequence and is expected to take night call. The Acting Intern can expect to manage between six and ten patients at a time. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Connors

460B. Acting Internship: Outpatient Pediatrics (3-18)
Clinical activity—full time (2 to 12 weeks). Prerequisite: completion of course 430 with grade of B or better; letter of recommendation from Pediatrics faculty member. Supervised experience in pediatric care on outpatient service at UCDMC. Student functions as "Acting Intern" with appropriate supervision by residents and attending faculty. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

461. Pediatric Inpatient AI in Hematology/Oncology (6)
Clinical activity—37.5 hours; lecture—7.5 hours. Prerequisite: satisfactory completion of course 430; consent of instructor. Inpatient and outpatient experience in diagnosis and management of oncologic and hematologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Taylor

462. Elective in Pediatric Endocrinology (3-18)
Clinical activity—full time (2 to 12 weeks). Prerequisite: completion of second-year study or the equivalent; consent of instructor. Inpatient and outpatient experience in diagnosis and management of endocrine disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

464. Acting Internship in Neonatology (6-18)
Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of course 430 with grade of B or better; letter of recommendation from Pediatrics faculty member. Diagnostic and therapeutic aspect of the medical and surgical high-risk neonate. Student expected to take night call. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Merritt

465. Pediatric Specialty Clinic Elective (3-18)
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Supervised experience in a variety of pediatric subspecialty clinics. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

466. Elective in Pediatric Cardiology (3-18)
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430. Inpatient and outpatient experience in diagnosis and management of cardiologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Parrish

467. Elective in Pulmonary Medicine (3-18)
Clinical activity—full time (2 to 12 weeks); daily rounds, two weekly half-day clinics. Prerequisite: pediatric clerkship. Inpatient and outpatient management of pediatric patients with pulmonary diseases. These will include but will not be limited to cystic fibrosis, asthma, and other forms of chronic pulmonary diseases as well as congenital abnormalities. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) McDonald, Joad

468. Elective in Pediatric Nephrology (3-18)
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Inpatient and outpatient experience in diagnosis and management of renal disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Makker

469. Elective in Pediatric Infectious Disease (3-18)
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Inpatient and outpatient experience in diagnosis and treatment of infectious disease of infants and children. Laboratory and clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Wenman

470. Elective in Pediatric Neurology (3-18)
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430, Internal Medicine 430, Obstetrics and Gynecology 430, and Pediatrics 430 and consent of instructor. Inpatient and outpatient experience in diagnosis and management of neurological disorders in children. Students will also participate in other pediatric subspecialty clinics which serve children with neurological disorders. This course does not satisfy the fourth year neurology requirement. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Gospe

471. Elective in Pediatric Gastroenterology (3-18)
Clinical activity—full time (2 to 12 weeks). Prerequisite: satisfactory completion of course 430; consent of instructor. Inpatient and outpatient experience in diagnosis and management of gastroenterology disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

472. Clinical Rotation in Adolescent Medicine (6)
Clinical activity—39 hours; lecture—1 hour. Prerequisite: consent of instructor; fourth-year medical student. Under supervision, students will see patients in

the UC Davis clinic and at a number of community-based sites. Emphasis on the socially-mediated problems that face adolescents, including substance abuse, STD's, pregnancy, depression and suicide. One hour of lecture each week. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Wilkes

473. Away Acting Internship in Pediatrics (6-18)
Clinical activity—40 hours; lecture—6 hours. Prerequisite: satisfactory completion of Pediatrics Clerkship; consent of instructor. Work at the level of a sub intern in Inpatient and/or Outpatient settings. Expectation is to provide direct patient management. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Butani

476. Acting Internship in Pediatric Intensive Care (6-18)
Clinical activity—full time (4 to 12 weeks). Prerequisite: completion of course 430 with grade of A or consent of instructor of record; letter of recommendation from Pediatrics faculty member. Evaluation and support of critically ill infants and children. In general, student expected to take night call every third night during rotation. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Dimand

493. Ethical, Legal and Social Issues in Clinical Genetics (6)
Seminar—12 hours; clinical activity—18 hours; autotutorial—8 hours; independent study—2 hours. Prerequisite: consent of instructor. Restricted to UC Davis School of Medicine students only. Develop advanced knowledge, communication skills and attitudes necessary to provide compassionate, knowledgeable, and expert care to patients who may be at increased genetic risk for disease. Seminars cover ethical and legal principles, epidemiology, and genetics. (H/P/F grading only.)—II. (II.) Rich, Wilkes

498. Directed Group Study (1-5)
Variable—3-15 hours. Explore in-depth various topics in Pediatrics. Extensive contact with and oversight by instructor. May be repeated for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Li

499. Research Topics in Pediatrics (1-18)
Prerequisite: student in Medical School with consent of instructor. Individual research project in pediatric subspecialty areas (cardiology, endocrinology, hematology, metabolism, newborn physiology and others) may be arranged with faculty member. Independent research by student will be emphasized and long-term projects are possible. (H/P/F grading only.)

Physical Medicine and Rehabilitation (PMR)

Upper Division Courses

100. Research Approaches to Disability and Rehabilitation (2)
Lecture/discussion—2 hours. Discussion and evaluation of research approaches to medical rehabilitation, community integration, and quality of life of disabled persons, with a focus on the progressive disabilities associated with neuromuscular diseases. Intent is to encourage interest in professions that serve the disabled community and increase awareness of rehabilitation goals.—II.

198. Directed Group Study (1-5)
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

Graduate Course

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

440. Rehabilitation Medicine Clerkship (3)
Clinical activity—36 hours; lecture/discussion—4 hours. Prerequisite: consent of instructor; completion of Internal Medicine 430, Surgery 430. Rehabilitation and comprehensive care of physically disabled and physical medicine management of neurologic, neuromuscular and musculoskeletal disorders. Emphasis on evaluation and conservative treatment of spinal disorders, sports injuries and neuromuscular disease. Emphasis on inpatient rehabilitation, pediatrics, spine or sports possible. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Davis

461. Rehabilitation Medicine (6)
Clinical activity—36 hours; lecture/discussion—4 hours. Prerequisite: consent of instructor; completion of Internal Medicine 430, Surgery 430. Four-week rotation designed as broad overview of PM&R practice for students interested in residency training in the specialty. Emphasis on evaluation and conservative treatment of spinal disorders, sports injuries, neuromuscular disease, neurological and non-operative orthopedic problems requiring rehabilitative management. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Davis

462. Rehabilitation Medicine Clinical Elective (5-18)
Clinical activity—full time. Prerequisite: Internal Medicine 430, Surgery 430; completion of third year in Medical School. Emphasis on evaluation of patients with neurological or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Physical Medicine and Rehabilitation at off-campus facility must be approved by Chairperson. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

493. Applied Musculoskeletal Anatomy: Sports & Spine SSM (6)
Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor; restricted to UC Davis School of Medicine students only. This four week module will review the anatomy and biomechanics of the musculoskeletal system as well as its associated pathology. The students will be instructed on appropriate musculoskeletal exam techniques and logical approach to the patient in the clinical setting. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Shin

498. Advanced Group Study (1-5)
Prerequisite: consent of instructor. Study and experience for medical students in any of a number of areas in physical medicine and rehabilitation. (H/P/F grading only.)

499. Research for Medical Students (1-12)
Prerequisite: consent of instructor. Research on any of a variety of topics in physical medicine and rehabilitation. (H/P/F grading only.)

Psychiatry (PSY)

Lower Division Course

92. Willow Clinic (1-2)
Clinical activity—2-6 hours; seminar—1-2 hours. Open to lower division undergraduate students. Student run clinic for undergraduate students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Clark, Han, McCarron

Upper Division Courses

198. Directed Group Study (1-5)
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

Graduate Courses

298. Directed Group Study For Graduate Students (1-5)
Prerequisite: graduate standing and consent of instructor.

299. Special Study for Graduate Students (1-12)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Courses

403. Fundamentals of Clinical Psychiatry (3)
Clinical activity—1 hour; lecture—3 hours. Prerequisite: approval of SOM Committee on Student Progress; restricted to medical students only. Psychiatric interviewing, Mental Status Exam and diagnosis. Major child and adult disorders, including substance abuse and dependence. Weekly student interviews of psychiatric patients in small group format. (P/F grading only.)—II. (II.) Minzenberg, Xiong

412. Psychiatry Grand Rounds (1)
Lecture—1 hour. Prerequisite: medical students or staff or other qualified mental health professionals with consent of instructor. Weekly conference at UCDMC for presentation of selected clinical cases, presentation of lecture and research reports. (H/P/F grading only.)—II, III, IV. (II, III, IV.) Ton

413. Outpatient Psychiatry Clerkship (6)
Clinical activity—36 hours; conference—2 hours; lecture—2 hours. Prerequisite: course 430 and/or consent of coordinator. Experience in clinical management/treatment of adult outpatients with psychiatric and substance abuse disorders; crisis management/intervention, evaluation/development of diagnosis and treatment plan; emphasis on outpatient psychopharmacology/brief psychotherapy; observation of group therapy. Individual supervision by faculty/residents. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Ton

414. Psychosomatic Medicine Clerkship (3-12)
Clinical activity—32 hours; discussion—8 hours. Prerequisite: Psychiatry Clerkship or consent of instructor; medical students only. A large university hospital service in which the student functions as a member of the team in evaluation, management and psychiatric liaison with other medical specialties. Intensive supervision from senior staff and psychiatric residents. May be repeated two times for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Ton

416. Child Psychiatry Clerkship (6)
Clinical activity—36 hours; lecture/discussion—2 hours; conference—2 hours. Prerequisite: course 430 and/or consent of instructor. Didactic and clinical inpatient, outpatient, and consultation-liaison experiences with children, adolescents and families. Clinical observations, diagnostic assessment, and treatment will be undertaken with close supervision. Literature review and case conferences presented on a regular basis. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Ton

417. Jail Psychiatric Clerkship (6)
Clinical activity—28 hours; conference—8 hours; lecture—4 hours. Prerequisite: course 430 and/or consent of course coordinator. Students gain experience, under close faculty supervision, assessing acute and chronic mentally ill inmates in both inpatient and clinic settings. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Ton

418. Off-Campus Clinical Experience (6 or 12)
Clinical activity—full time (4 or 8 weeks). Prerequisite: fourth-year medical students; consent of instructor. Clinical or research elective in off-campus medical school or mental health setting. To be arranged with advance approval of instructor and individual in charge of off-campus setting. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

420. Acting Internship in Psychiatry (62)
Clinical activity—40 hours. Prerequisite: course 430 and/or consent of course coordinator. Acting intern position with close faculty supervision with emphasis on biological psychiatry, psychopharmacology and psychodynamic aspects appropriate to diagnostic and long-term patient management. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

421. Combined Medicine-Psychiatry Clerkship (3-6)
Clinical activity—32 hours; discussion—8 hours. Prerequisite: Psychiatry Clerkship or consent of instructor; medical students only. Students will rotate through the county Primary Care Clinic under the

supervision of dual-boarded Psychiatry and Internal Medicine/Family Practice Faculty to provide medical care of indigent and uninsured patients as well as primary care for psychiatry patients. May be repeated for credit two times. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) McCarron, Onate, Ton

422. Readings in Psychiatry (1-3)
Readings/discussion—3-9 hours. Independent reading of a selected topic in psychiatry. Supervision and discussion with a psychiatry faculty member. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Ton

423. Willow Clinic (3-12)
Prerequisite: open to medical students in all four years of medical school. Student run clinic for medical students interested in learning about and meeting the unique health care needs for the homeless population. May be repeated for credit. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Clark, Han, McCarron

424. Functional Genomics (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing or consent of the instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (H/P/F grading only.)—II. (II.) Choudary

430. Psychiatry Clinical Clerkship (12)
Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Assigned to clinical settings, students build upon the skills gained in preclinical years; emphasis on diagnostic, therapeutic and interpersonal skills. Areas of focus include patient management, interviewing skills, mental status exam, differential diagnosis, basic psychopharmacology, crisis assessment, intervention and case referrals. (H/P/F grading only.)—I, II, III, IV. Cox

480. Insights in Psychiatry (1-3)
Clinical activity—3–9 hours. Prerequisite: first- or second-year medical student in good academic standing; consent of instructor. On individual basis, student provided with an opportunity for gaining insight into various clinical activities in the practice of psychiatry. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Cox

488. Acting Internship in Inpatient Psychiatry, Away Rotation (6)
Clinical activity—40 hours. Prerequisite: Psychiatry Clerkship and/or consent of course coordinator. Inpatient acting internship at approved non-UCDHS affiliated training program that provides experience and preparation for ambulatory medical care. Students perform as an intern, with a smaller number of patients, greater supervision, and responsibility for the ongoing care of assigned patients. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

489. Acting Internship in Ambulatory Psychiatry, Away Rotation (6)
Clinical activity—40 hours. Prerequisite: Psychiatry Clerkship and/or consent of course coordinator. Outpatient acting internship at an approved non-UCDHS affiliated training program that provides experience and preparation for ambulatory medical care. Students perform as an intern, with smaller number of patients, greater supervision, and responsibility for the ongoing care of assigned patients. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

493. Culture, Medicine and Society (6)
Seminar—12 hours; clinical activity—16 hours; independent study—8 hours; discussion—4 hours. Prerequisite: consent of instructor; UC Davis School of Medicine students only. Students will learn about the epidemiological significance of health disparities and barriers to access to health care. The course will cover (1) Epidemiology/Health Disparities; (2) Society and Medicine; (3) Cinemeducation; (4) Reflection/Integration. (H/P/F grading only.)—III. (III.) Ton, Wilkes

498. Directed Group Study (1-5)
Prerequisite: consent of instructor. Approved for graduate degree credit. Medical students desiring to explore particular topics in depth. (H/P/F grading only for graduate or medical students.)

499. Research (1-12)
Prerequisite: consent of instructor. Approved for graduate degree credit. Individual research on selected topics or research projects. (H/P/F grading only for graduate or medical students.)—Ton

Public Health Sciences (SPH)

Lower Division Courses

92. Internship in Community Health (1-12)
Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Students apply theory and concepts learned in the classroom through field work in a community health agency. (P/NP grading only.)

Upper Division Courses

101. Perspectives in Community Health (3)
Lecture—3 hours. Prerequisite: undergraduate standing. Covers comprehensively the responsibilities, obligations, roles and professional activities of various health care disciplines in the community; provides students with perspectives on preventive medicine in society.—III. (III.)

132. Health Issues Confronting Asian Americans and Pacific Islanders (4)
Lecture/discussion—4 hours. Health issues confronting Asian Americans and Pacific Islanders. (Same course as Asian American Studies 132.)—II. (II.)

160. General Health Education and Prevention (5)
Lecture—4 hours; discussion—1 hour. Restricted to students in the internship program for the Health Education Program only. Topics include addiction, substance abuse/prevention, nutrition, stress management, physical fitness, body image, reproductive anatomy and physiology, contraceptive options, safer sex, sexual health, healthy relationships, and other general wellness/health promotion topics. Practice in peer counseling and outreach presentations. Limited enrollment. (P/NP grading only.)—IV. (IV.) Ferguson

161. Campus Alcohol/Drug Abuse Prevention Program Peer Educator Training (4)
Lecture/discussion—3 hours; practice—1 hour. Prerequisite: course 160 (may be taken concurrently); consent of instructor. Preparation for internship in campus and community substance abuse prevention and educational intervention. Addiction and other physiological responses to alcohol and other drugs. Harm-reduction strategies for individuals and target populations. High risk behaviors. Practice in peer counseling skills and outreach presentations to small and large groups. (P/NP grading only.)—III. (III.)

162. Health Advocates Peer Educator Training (4)
Lecture/discussion—3 hours; practice—1 hour. Prerequisite: course 160 (may be taken concurrently); consent of instructor. Preparation for internship in campus and community health promotion and risk reduction. Nutrition, stress management, physical fitness, body image and disordered eating, skin cancer prevention, and other general wellness/health promotion topics. (P/NP grading only.)—III. (III.)

175W. Health Policy and Health Politics (4)
Seminar—3 hours; extensive writing or discussion—1 hour. Restricted to students attending UC Washington Center program. Following the model of a Congressional subcommittee, identification of four salient health policy issues for study, research, and development of model policies to address them. (Same Course as UC Davis Washington Center 175.) GE Credit: SocSci, Wrt.—III. (III.) Wintemute

190C. Research Conference in Community and International Health (1)
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress, and techniques in Community and International Health. Critical discussion of recent journal articles. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship in Community Health Practice (1-12)
Internship—3-36 hours. Prerequisite: upper division and graduate students; consent of instructor. The student, through fieldwork in a community health agency, learns to apply theory and concepts learned in the classroom. (P/NP grading only.)

198. Study in Community and International Health (1-5)
Prerequisite: undergraduate standing and consent of instructor. Study and experience for undergraduate students in any number of areas in community and international health. (P/NP grading only.)

199. Research in Community and International Health (1-5)
Prerequisite: undergraduate standing; consent of instructor. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (P/NP grading only.)\

Graduate Courses

210. Public Health Informatics (2)
Lecture—2 hours; laboratory—2 hours. Restricted to upper division or graduate standing. Collection, verification, and utilization of data related to populations; infrastructure, functions, and tools used to generate public health knowledge supporting public health practices and policy development/dissemination. (S/U grading only.)—IV. (IV.) Doebbert, Hogarth

212. Migration and Health (3)
Lecture/discussion—3 hours. Prerequisite: graduate standing. Principles of migration and health. Topics will include demographics, public health invention programs, health care delivery, occupational health, and effects of international migration on the health in communities of origin, transit and destination. Guest presentations by outside experts. Offered in alternate years. (S/U grading only.)—(III.) Schenker

222. Social & Behavioral Aspects of Public Health (3)
Lecture/discussion—3 hours. Prerequisite: consent of instructor required; graduate standing, Statistics 102 and 106. Theories and strategies of health behavior change at the individual, group, community, and environmental levels. Examples include: transtheoretical model, social networks, and social marketing. Theories are applied to solve common public health problems (cancer, obesity, smoking, and HIV/AIDS.—II. (II.) Cassady

244. Introduction to Medical Statistics (4)
Lecture/discussion—6 hours; laboratory/discussion—3 hours. Introduction to statistical methods and software in clinical, laboratory and population medicine. Graphical and tabular presentation of data, probability, binomial, Poisson, normal, t-, F-, and Chi-square distributions, elementary nonparametric methods, simple linear regression and correlation, life tables. Only one unit of credit for students who have completed Statistics 100 or Preventive Veterinary Medicine 402.—IV. (IV.) Yang

245. Statistical Analysis of Laboratory Data (4)
Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: consent of instructor required; course 244 or equivalent. Preference to K30 training program students. The analysis of data and design of experiments for laboratory data with an emphasis on gene expression arrays and other high-throughput biological assay technologies.—III. Rocke

246. Biostatistics for Clinical Research (4)
Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: courses 244 and 245. Emphasizes critical biostatistics for clinical research and targets biomedical audience. Students will develop

understanding for basic planning and analysis of clinical studies and learn to develop collaborations with biostatisticians.—II. Qi

247. Biostatistics for Epidemiology (4)
Lecture—3 hours; laboratory/discussion—1 hour. Prerequisite: courses 246. Introduction to the principles and methods of statistical inference for categorical data and survival data in epidemiological studies. The major topics include contingency table methods, logistic regression, Kaplan-Meier and log-rank methods, and Cox regression.—I. (I.) Kim

252. Social Epidemiology (2)
Lecture/discussion—2 hours. Prerequisite: Epidemiology 205A; consent of instructor. Social determinants of health; psychosocial and physiological pathways; health and social inequality; gender and racial/ethnic disparities in health; social support, social cohesion and health; social gradient in behavioral risk factors; social ecological approaches to health intervention; interventions addressing social determinants. (Same Course as Epidemiology 252.)—III. (III.) Gibson

255. Human Reproductive Epidemiology (3)
Lecture—3 hours. Prerequisite: Preventative Veterinary Medicine 405, 406, Physics 220, Physiology 222 or equivalents, or consent of instructor. Human reproductive effects and risk of reproductive disorders, examined from macro- and micro-environmental exposures in community and occupational settings, epidemiologic study designs and analyses. Offered in alternate years.—I. Hertz-Picciotto

262. Principles of Environmental Health Science (3)
Lecture—3 hours. Prerequisite: consent of instructor required. Principles, approaches and issues related to environmental health. Recognizing, assessing, understanding and controlling the impact of people on their environment and the impact of the environment on the public.—I. (I.) Bennett

264. Public Health Econometrics (2)
Laboratory/discussion—3 hours. Prerequisite: consent of instructor. Principles of demand and supply; elasticity; benefits and costs; least squares regression; stepwise regression; economic and statistical significance; fixed and random effects; longitudinal data; non-linear relations; continuous and binary variables; instrumental variables; attrition bias; tobit regression; Two-part cost model. (S/U grading only.)—III. (III.) Leigh

266. Applied Analytic Epidemiology (3)
Lecture—2 hours; laboratory—2 hours. Prerequisite: Preventive Veterinary Medicine 404 or consent of instructor. Principles and applications in analysis of epidemiologic data. Methods of analyzing stratified and matched data, logistic regression for cohort and case-control studies, Poisson regression, survival-time methods. (Same course as Population Health and Reproduction 266.)—III. (III.) Kass

273. Health Services Administration (3)
Laboratory—3 hours. Prerequisite: consent of instructor required. Structure and function of public and private medical care. Topics include categories and trends in national medical spending, predictors of patient use, causes of death, managed care, HMOs, Medicare, Medicaid, costs of technology, and medical care in other countries. Limited enrollment.—II. (II.) Leigh

290. Topics in Public Health (1)
Seminar. Prerequisite: consent of instructor. Open to students in Master of Public Health program, or permission of instructor. Seminar on key issues and current topics in public health. Course begins in August SSII. Students must enroll in August, then Fall and Winter. The course is a series but grades and units are given at end of each quarter. May be repeated four times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Leistikow, Kass, McCurdy, Schenker

295. International Health (2)
Lecture/discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Forum for learning health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. (S/U grading only.)—III. (III.) Koga, Schenker

297. Public Health Practicum (1-16)
Prerequisite: consent of instructor. Open to Master of Public Health students. Practical fieldwork experience in public health. Placement site will vary based on the interest and experience of each student. May be repeated four times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) McCurdy

298. Study in Community and International Health (1-5)
Prerequisite: graduate student in good academic standing; consent of instructor. Study and experience for graduate students in any number of areas in community and international health. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.)

299. Research in Community and International Health (1-12)
Prerequisite: graduate standing; consent of instructor. Student will work with faculty member in areas of research interest, including but not limited to injury control, international health, health policy, occupational and environmental health, health promotion and wellness, womens health, and health demographics. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.)

Professional Courses

402. Introductory Medical Spanish (2)
Lecture—2 hours. Prerequisite: medical student or consent of instructor. The vocabulary needed to conduct a basic history and physical examination in Spanish. (H/P/F grading only.)—III. (III.)

461. Clerkship in Community Health Group Practice (3-9)
Clinical activity—full time (2-6 weeks). Prerequisite: third- or fourth-year medical student. Overview of local community health in group practice situations. Students participate in treatment at several clinic sites in Yolo County. Topics include primary care, environmental health, maternal and child health, jail health, and preventive health care for the aged. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.)

465. Community Health Preceptorship (3-18)
Clinical activity—5-40 hours. Prerequisite: fourth-year medical student; consent of instructor. Participate at state or county health department or other public health organization in on-going investigations into current public health problems, e.g., birth defects, cancer control, diabetes, hypertension, injury control, infectious diseases, aging, Alzheimer's disease, and smoking and tobacco use control. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) McCurdy

466. Occupational and Environmental Medicine Elective (6-12)
Clinical activity; laboratory. Prerequisite: fourth-year medical student in good academic standing; consent of instructor. Participate in activities of Occupational and Environmental Health Unit. Major activity is involvement in an epidemiologic research project of the University. Participate in Occupational and Environmental Medicine Clinic at UC Davis Medical Center and other sites, as arranged. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) McCurdy

470. Clinical Selective in Occupational and Environmental Medicine (3-6)
Clinical activity—9-18 hours. Prerequisite: fourth-year medical student in good academic standing; consent of instructor. Outpatient clinical experience in Occupational and Environmental Medicine at UCDMC and other sites, as arranged. Gain experience in evaluating occ/env medical conditions, use of medical literature resources, the worker's compensation system, and toxicological principles. Students may take up to four weeks for six units. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) McCurdy

480. Insights in Occupational and Environmental Medicine (1-3)
Clinical activity—3-9 hours. Prerequisite: first- or second-year medical student in good academic standing; consent of instructor. Observe and participate in research and clinical activities in occupational and environmental medicine which include conferences, occupational and environmental medicine clinical activities and field visits. Develop and present small individual research projects. (P/F grading only.)—I, II, III, IV. (I, II, III, IV.) McCurdy

495. International Health (2)
Lecture/discussion—2 hours. Prerequisite: medical student in good academic standing; consent of instructor. Forum for learning health issues and health care systems in other countries. Topics include health care for refugees, the impact of political strife on health, the health care professional in international settings. (H/P/F grading only.)—III. (III.) Koga, Schenker

496. Current Issues in Public Health (1)
Lecture/discussion—1 hour. Topical issues in public health. Speakers from the local public health community address issues such as disease control programs, access to care. May be repeated up to three times for credit. (P/F grading only.)—III. (III.) McCurdy

498. Study in Public Health Sciences (1-6)
Prerequisite: medical student in good academic standing and consent of instructor. Study and experience for medical students in areas in community and international health. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

499. Research in Public Health Sciences (1-9)
Prerequisite: medical students with consent of instructor. Work with faculty member in areas of research interest, including but not limited to public health, injury control, international health, health policy, occupational and environmental health, health promotion and wellness, women's health, and health demographics. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

Radiation Oncology (RON)

Graduate Courses

211. Introduction to Radiation Oncology Physics (3-6)
Prerequisite: consent of instructor; restricted to physics and engineering graduate students and senior undergraduate physics majors. Not more than three students total enrolled in course 211 at a time. Introduction to radiation oncology physics. Overview of treatment methodologies. Medical physics equipment. Treatment machine dosimetry, including calibration. Machine quality assurance. Patient dosimetry. Treatment planning. Simulation and treatment. Treatment quality assurance, including calculation checks and chart checks. Brachytherapy. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Stern

299. Independent Study and Research (1-12)
Clinical activity—full time (2-8 weeks). Prerequisite: enrollment with Biomedical Engineering Group for Ph.D. candidacy and consent of Group Advisor and Sponsor. Research under supervision of Radiation Oncology faculty. Work must be appropriate to fulfill the requirements for the Ph.D. degree. (S/U grading only.) Vaughan

Professional Courses

420. Fundamentals of Radiobiology (1)
Lecture—3-4.5 hours; term paper. Prerequisite: Biological Sciences 1A, Mathematics 12, Physics 1A. Major topics in radiation biology. The experimental basis of our current understanding of therapeutic radiation to cancer and normal tissue; and the translation of basic radiobiologic knowledge into clinical usage. May be repeated two times for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Li, Vaughan

463. Radiation Oncology Clerkship (3-9)
Clinical activity—full time (2-6 weeks). Prerequisite: completion of Medical Sciences 430, 431; third-year clinical clerkship, consent of instructor required. Introduction to radiation oncology. Students will participate in workup and treatment planning for radiation oncology patients and will be introduced to the concepts involved in clinical radiation oncology, radiation biology, and radiation physics. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Chen

498. Group Study in Therapeutic Radiology (1-12)
Prerequisite: consent of instructor. Approved for graduate degree credit. (H/P/F grading only for medical students.)

499. Research in Radiobiology (3-12)
Clinical activity—full time (2-8 weeks). Prerequisite: consent of instructor. Laboratory investigation on selected topics involving response of biological molecules, cells, tissues or animals to ionizing radiation. (H/P/F grading only.) Vaughan

Radiology—Diagnostic (RDI)

Professional Courses

413. Radiological Diagnosis II (Physics of Diagnostic Radiology) (5)
Lecture—49 hours total; laboratory—6 hours total. Prerequisite: consent of instructor. Physics of diagnostic imaging; x-ray production and interaction; image formation; modulation transfer function; fluoroscopy; cine fluoroscopy; stereoscopy; xeroradiography; computerized and geometrical tomography; magnetic resonance and ultrasound. Principles of radiation protection in imaging will be covered. (H/P/F grading only.)—I. (I.) Seibert, Boone

414. Medical Radiation Biology (3)
Lecture—27 hours total. Prerequisite: consent of instructor. Medical radiation biology; molecular cellular and organ system response to acute and chronic irradiation; radiation carcinogenesis and genetic effects; radiation risk assessment; diagnostic ultrasound and magnetic resonance imaging health effects. Medical/legal considerations of radiation exposure. Offered in alternate years. (H/P/F grading only.)—III. Bushberg

461. Clinical Clerkship in Diagnostic Radiology (6)
Clinical activity—35 hours; conference—4 hours; discussion/laboratory—1 hour. Prerequisite: satisfactory completion of second year medical school curriculum, and of third-year clerkships in Internal Medicine and General Surgery; consent of instructor of record. Restricted to eight students per rotation; open to visiting medical and osteopathic students from accredited programs. Work with clinical Radiologists in image interpretation, fluoroscopy, angiography, image-guided intervention, cardiac stress testing, radionuclide therapy. Daily conferences in Radiology Diagnosis and Therapy, Health Physics, Radiation Safety. Prepare three clinical cases for in-class presentation. Assigned readings. Comprehensive final examination. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Hagge

462. Diagnostic Imaging of Acquired and Congenital Heart Disease (2)
Lecture/discussion—5 hours (for 3 weeks). Prerequisite: fourth-year medical student in good academic standing and course 461 (may be taken concurrently). Main emphasis on radiology of acquired and congenital heart disease, but also on magnetic resonance, nuclear medicine, and echocardiography of heart diseases. (H/P/F grading only.)—III. (III.)

473. Advanced Clinical Clerkship in Neuroradiology (3-6)
Clinical activity—35 hours; conference—4 hours; independent study—1 hour. Prerequisite: fourth-year medical student with interest in Diagnostic Radiology, Neuroradiology, Neurology, Neurosurgery, Psychiatry, Psychology, or related field; satisfactory completion of course 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Work with Neuroradiologists in image interpretation of CT, MRI, and fluoroscopy. Opportunity to participate in assessment of Neurointerventional patients, and to observe Neurointerventional procedures. Daily conferences in Neuroimaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. Credit limited to 3 units for 2 weeks; 6 units for 4 weeks. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Latchaw

474. Advanced Clinical Clerkship in Pediatric Radiology (3-6)
Clinical activity—30 hours; conference—5 hours; film viewing—3 hours; independent study—2 hours. Prerequisite: fourth-year medical students with interest in Radiology and/or Pediatrics; interested third-year medical students who have successfully completed Pediatrics clinical clerkships may enroll, given availability and consent of the instructor of record; prior completion of course 461, or the equivalent, encouraged. Restricted to two students per two-week or four-week rotation. Participation in the radiological care of Pediatric patients; evaluate the patient receiving the radiographic study, including pertinent historical/physical findings. Student expected to write up case files on interesting cases encountered during their rotation. 3 units for 2 weeks, or 6 units for 4 weeks. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Gorges

475. Advanced Clinical Clerkship in Musculoskeletal Radiology (MSK) (3-6)
Clinical activity—35 hours; conference—4 hours; discussion/laboratory—1 hour. Prerequisite: forth-year medical student with interest in Musculoskeletal Radiology, Orthopedic Surgery, Sports Medicine, PMNR, or related field; satisfactory completion of course 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Work with Musculoskeletal Radiologists in interpretation of CT, MRI, radiography, and fluoroscopy. Opportunity to assess patients for, and to observe image-guided procedures. Daily conferences in Musculoskeletal Imaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Hunter

476. Advanced Clinical Clerkship Vascular/Interventional Radiology (IR) (3-6)
Clinical activity—35 hours; conference—4 hours; discussion/laboratory—1 hour. Prerequisite: forth-year medical student with interest in Diagnostic Radiology, Vascular/Interventional Radiology, Cardiovascular Imaging, Cardiology, Cardiovascular Surgery, Surgical Oncology, General Surgery, or related field; satisfactory completion of course 461, or the equivalent, is strongly encouraged. Restricted to one student per 2/4 week rotation. Medical student will work with Vascular/Interventional Radiologists in the evaluation of patients for interventional procedures. There will be opportunities to Daily conferences in Neuroimaging, General Radiology, Health Physics, and Radiology Safety. Assigned readings. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Link

477. Advanced Clinical Clerkship in Ultrasound Radiology (3-6)
Clinical activity—30 hours; conference—5 hours; film viewing—3 hours. Prerequisite: forth-year medical student with interest in Radiology, OB/GYN, or in other medical or surgical subspecialties employing ultrasound in their clinical practice; prior completion of course 461, or the equivalent, is encouraged. Restricted to one student per 2/4 week rotation. Participation as an active team member on a busy clinical ultrasound service. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) McGahan

478. Advanced Clinical Clerkship Abdominal Imaging (3-6)
Clinical activity—35 hours; conference—4 hours; discussion/laboratory—1 hour. Restricted to one student per 2/4 week rotation. Work with clinical Radiologists on abdominal and pelvic CT, MR, ultrasound, digital radiography, gastrointestinal and genitourinary procedures, image-guided intervention. Offered as a 2-week rotation for third-year medical students and a 4-week rotation for forth-year medical students. Credit limited to 3 units for 2 weeks, 6 units for 4 weeks. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Lamba

498. Group Study in Diagnostic Radiology (1-12)
Prerequisite: consent of instructor. (H/P/F grading only.)

499. Research in Diagnostic Radiology (1-12)
Prerequisite: consent of instructor. Approved for graduate degree credit. (H/P/F grading only for medical students.)

Radiology—Nuclear Medicine (RNU)

Upper Division Courses

198. Directed Group Study (1-5)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Course

299. Research: Special Study for Graduate Students (1-12)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Courses

401. Biomedical Radiochemistry (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: open to graduate and medical students; consent of instructor. Approved for graduate degree credit. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry. Subjects include choice and purification of appropriate gamma and beta radioisotopes, compounding biological pharmacodynamics and radioimmunoassay. (H/P/F grading only.)—III. (III.)

411. Radiological Physics I (Physics of Nuclear Medicine) (5)
Lecture—43 hours total; laboratory—12 hours total. Prerequisite: consent of instructor. Physics of diagnostic and therapeutic nuclear medicine, nuclear physics, radioactive decay; interaction of ionizing radiation; dosimeters; attenuation; internal and external dosimetry; health physics; radiation detection and imaging, scintillation cameras, computerized planar and tomographic imaging. Offered at UC Davis Medical Center. Offered in alternate years. (H/P/F grading only.)—(I.) Bushberg, Vera

463. Clinical Clerkship in Nuclear Medicine (3-8)
Clinical Activity—full time (2-6 weeks). Prerequisite: satisfactory completion of second-year medical school; Radiology—Diagnostic 461 recommended; consent of instructor. Clerkship correlates radioisotopic methods with clinical, pathophysiological, and other diagnostic aspects of the patient's care. Each patient reviewed with student by faculty member. Reading assignments, informal projects, and research techniques available. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Shelton

498. Group Study in Nuclear Medicine (1-12)
Prerequisite: consent of instructor. Approved for graduate degree credit. (H/P/F grading only for medical students.)

499. Research in Nuclear Medicine (1-12)
Prerequisite: consent of instructor. Approved for graduate degree credit. (H/P/F grading only for medical students.)

Surgery (SUR)

Upper Division Courses

192. Internship in General Surgery (1-12)
Internship—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in general surgery and related fields. (P/NP grading only.)

199. Special Study in General Surgery for Advanced Undergraduates (1-5)
Prerequisite: advanced undergraduate student with consent of instructor. (P/NP grading only.)

Graduate Course

299. Research (1-12)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Courses

430. Surgery Clerkship (12)
Clinical activity—45 hours. Prerequisite: approval by School of Medicine Committee on Student Progress. Eight week general surgery clerkship includes GI, Burn, Oncology, Plastics, Vascular Cardiothoracic, consult, transplant and trauma. Clerkship assignments are at UCDMC. Daily core material presentations and reading assignments. Student involvement includes work-up and care of surgical patients. (H/P/F grading only.)—I, II, III, IV. Wisner

460A. Clinical Surgical Elective (6-18)
Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430. Rotation through Surgery Specialty Clinics: Vascular, GI, GU, Thoracic, Plastic, Radiotherapy. Student works up one new and two return visit patients. Presents consult to on-site faculty. Weekly review with preceptor and course director. Reading assignments to add perspective for in-depth discussions. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Young

461. Surgery Burn Unit Clerkship (6 or 9)
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Externship in the eight-bed Burn Unit, and the 80 bed Shriners Hospital for Children. Principles of critical care, fluid and electrolyte resuscitation and management of surgical wounds in both adults and children. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

462. Surgery Trauma Service Clerkship (6 or 9)
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Student works as an extern on one of the two general surgery Trauma teams, participating in resuscitation and management of critically injured patients. Team hours consist of 24 hours on, and 24 hours off. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

463. Surgery Intensive Care Unit (6 or 9)
Clinical activity—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Student participates in direct supervision of critically ill surgical patients in a twelve-bed surgery ICU. Each student is closely supervised. Provides in-depth experience with management of critically ill patients. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

467. Surgical Oncology (3-9)
Clinical activity—full time (2 to 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Students actively participate in management of patients requiring surgery for cancer, endocrine disease and selected general surgical problems. Cases include malignant melanoma, sarcomas, gastrointestinal cancer, head and neck pathology, and metastatic malignancies. Attending rounds daily. Four teaching conferences weekly. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

468. Cardiothoracic Surgery Clerkship (6-9)
Clinical activity—full time (4 to 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of course 430. Student works as an extern on the Cardiothoracic Surgical Service, participating in perioperative management and operations on the heart, lungs, mediastinum, and other thoracic structures. Regularly scheduled teaching conferences are conducted. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Young

471. Gastrointestinal Surgery (3-9)
Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430, Internal Medicine 430 and Pediatrics 430. Student participates on the GI Surgery Service, working under the immediate supervision of the faculty and surgical housestaff, involving the full spectrum of gastrointestinal diseases performed by the medical student. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Ho

472. Vascular Surgery (3-9)
Clinical activity—full time. Prerequisite: fourth-year medical student or third-year medical student with completion of course 430, Internal Medicine 430 and Pediatrics 430. Student participates on the vascular surgery service and in the management and operations of arterial and venous system, exclusive of diseases that require cardiopulmonary bypass for treatment. Includes patient care responsibilities with appropriate supervision. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Holcroft

475. Pediatric Surgery (6-9)
Clinical activity—full time (4-6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of course 430. Care of patients with neonatal congenital surgical problems. Fluid and electrolyte management in infants. General experience with acquired surgical diseases in children. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Marr, Clifford

476. Surgical Consult Service (6-9)
Clinical activity—full time (4-6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of course 430. Students function as acting interns working in parallel with the interns on the service. They consult on all non-trauma patients in the emergency room and on the wards and also participate in the operating room. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Wisner

477. Clinically Oriented Anatomy (3)
Clinical activity—40 hours. Prerequisite: completion of three years of medical school. Anatomy of selected regions of the body using cadaver dissection, prosections and interactive CD-ROMs. Anatomical relationships relevant to common surgical procedures. Surgical and interventional radiology procedures. (H/P/F grading only.)—II. Khatri

478. Surgical Preceptorship: Off Campus (6-18)
Clinical activity—full time. Prerequisite: fourth-year medical student and consent of instructor. Student participates in the preoperative, operative and postoperative care of surgical patients under the supervision of attending staff. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Holcroft

480. Insights in Surgery (1-3)
Clinical activity—3-9 hours. Prerequisite: medical student in good academic standing and consent of instructor. Individualized activities, including ward rounds, subspecialty clinics and conferences, grand rounds, and observation of a variety of surgical procedures. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

481. Interactive Clinical Case Presentation (ICCP) (3)
Clinical activity—1 hour. Prerequisite: fourth year medical students; open for third and fourth year student observers; maximum of 10-15 students in good standing. Case presentation of common clinical scenarios (i.e. chestpain/MI; fever/pneumonia; abdo pain/chlecy stites, etc.) from various discipline held in an auditorium with real patients exposure. Interactive session to review history, physical findings and case management. Students will be asked to perform H&P. Course taught as one session (4 hours) per month for three quarters (July to March). The students who enroll can earn up to three credits and the minimum requirements will be to attend at least six sessions. Students can do all nine sessions and work toward an honor. For the written part students will have to pick two of the nine case presentations and write a detailed paper with a literature review on "The Current management" of that disease-this can in fact be a manuscript submitted for publication with a faculty member as an advisor. (H/P/F grading only.)—I, II, IV. (I, II, IV.) Khatri

493. Clinically-Oriented Anatomy Special Study Module (6)
Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor. Restricted to School of Medicine students only. Reviews aspects of the anatomy of the head and neck, thoracic cavity, abdomen, pelvis, extremities, vascular system, peripheral nervous system and central nervous system. Focus on the understanding of anatomy related to common surgical procedures. (Cell Biology and Human Anatomy 493.) (H/P/F grading only.)—III. (III.) Blankenship, Khatri

493D. Interdisciplinary Study of Gastrointestinal Cancer (6)
Lecture—5 hours; clinical activity—12 hours; laboratory—3 hours; discussion/laboratory—20 hours. Prerequisite: consent of instructor. In-depth study of gastrointestinal, hepatic and pancreatic cancer. Emphasis on an integration of basic science and clinical medicine. Participating departments include pathology, surgical oncology, medical oncology, gastroenterology, radiology and radiotherapy. (Same Course as Pathology 493D.) (H/P/F grading only.)—II, III. (II, III.) Khatri, Ruebner, Saroufeem

493B. Critically Ill Surgical Patients SSM (6)
Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor; UC Davis School of Medicine students only. Special Study Module, a four week course on the topic: Application of Basic Cardiopulmonary Physiology to Problems Encountered in Critically Ill Surgical Patients. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Holcroft

493C. Physiological Principles in SICU SSM (6)
Lecture—5 hours; lecture/laboratory—10 hours; laboratory—16 hours; clinical activity—4 hours. Prerequisite: consent of instructor; restricted to UC Davis School of Medicine students only. Special Study Module, a four week course on the topic: Care of the Critically Ill Surgical Patient: Use of Physiological Principles to Guide Treatment of Patients with Common Surgical Problems. (Same course as Human Physiology 493C.) (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Cala, Holcroft

493D. Interdisciplinary Study of Gastrointestinal Cancer (6)
Lecture—5 hours; clinical activity—12 hours; laboratory—3 hours; discussion/laboratory—20 hours. Prerequisite: consent of instructor. In-depth study of gastrointestinal, hepatic and pancreatic cancer. Emphasis on an integration of basic science and clinical medicine. Participating departments include pathology, surgical oncology, medical oncology, gastroenterology, radiology and radiotherapy. (Same Course as Pathology 493D.) (H/P/F grading only.)—II, III. (II, III.) Khatri, Ruebner, Saroufeem

494H. Fourth-Year Surgical Honors Program (18)
Prerequisite: completion of third year of medical school with superior performance on course 430; consent of instructor. To provide intensive and comprehensive training in surgery to students interested in a postgraduate surgical career, that would enable them to succeed during the internship and residency training. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Holcroft

495. Intense Introduction to Cardiac Surgery (3)
Clinical activity—16 hours; lecture/discussion—4 hours. Prerequisite: consent of instructor. Restricted to Medical student between first and second year. Close contact with vascular surgeon for two-week period. Includes Sunday mornings. 100% mandatory attendance. Physiology of going on and off cardiopulmonary bypass. Atherosclerotic cardiovascular disease, structural and valvular heart disease and electrical and rhythmic heart disease. May be repeated one time for credit. (P/F grading only.)—IV. (IV.) Jan

498. Group Study (1-5)
Prerequisite: medical student; consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

499. Laboratory Research (1-12)
Laboratory—3-36 hours. Prerequisite: completion of second year of medical school; 6consent of instructor. Laboratory research on surgically related problems. Participation in projects to include the following: burn, nutrition, oncology, transplant and others. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.)

Surgery—Plastic Surgery (PSU)

Professional Courses

460. Clinical Plastic Surgery Elective (1-18)
Clinical activity—full time (approximately 40 hours per week). Prerequisite: third- or fourth-year medical students; Surgery 430; consent of instructor. Total involvement in patient care involving surgical preparation, treatment, operative care, and follow-up. Developing and understanding reconstruction and aesthetic plastic surgery. Microvascular surgery included. Student rotation. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Stevenson

Urology (URO)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)—deVere White

Professional Courses

400. Office Urology (1)
Clinical activity—4 hours in afternoons (6 weeks). Prerequisite: fourth-year medical students with consent of instructor. Introduction to ambulatory care of urologic patients including basic therapeutic and diagnostic procedures from case material referred to private clinic. Management of urinary tract infection will be emphasized. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Low

460. Urology Clinical Clerkship (5-18)
Clinical activity—full time. Prerequisite: second-year medical student; physical diagnosis or the equivalent; consent of instructor. Clinical experience in diagnosis and treatment of urologic disease. Student will work closely with house staff, participate in conferences and surgery, and perform initial patient evaluation on new patients. May be repeated for credit. Limited enrollment. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Low

461. Externship in Urology (5-18)
Clinical activity—full time. Prerequisite: fourth-year medical students with consent of instructor. Under supervision, student acting as intern will assume full inpatient responsibility including admission history, physical examination, management of hospitalization, and participate in surgical procedures, outpatient clinic and learning diagnostic and therapeutic procedures. May be repeated for credit. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Low

499. Research in Urology (1-12)
Research—3-36 hours. Prerequisite: medical or veterinary medical students with consent of instructor. Research in oncology, male infertility, urodynamics, neurogenic bladder. Unique opportunity to apply recent technologies (nuclear medicine resonance, flow cytometry, recombinant DNA) in investigation, diagnosis and treatment of GU cancer, infectious disease, male infertility and development of genitourinary bioprosthetics. (H/P/F grading only.)—I, II, III, IV. (I, II, III, IV.) Low

Medicine and Epidemiology

See Medicine and Epidemiology (VME), on page 522.

Medieval and Early Modern Studies

(College of Letters and Science)

Don Abbott, Ph.D., Program Director

Program Office. 176 Voorhies Hall
(530) 752-2257; *http://mems.ucdavis.edu*

Committee in Charge

Don Abbott, Ph.D. *(English)*
Catherine Chin, Ph.D. *(Religious Studies)*
Noah Guynn, Ph.D. *(French and Italian)*
A. Katie Harris, Ph.D. *(History)*
Rex Stem, Ph.D. *(Classics)*
Claire Waters, Ph.D. *(English)*

The Major Program

The major in Medieval and Early Modern Studies examines the intellectual, political, and cultural forces that shaped modern European civilization during the period from the end of Ancient Rome (fifth century) to the beginning of the Enlightenment (mid-eighteenth century). An interdisciplinary and interdepartmental program, the major includes studies in history, art history, philosophy, literature, drama, music, national languages, religion, rhetoric, and political theory.

The Program. The major requires interdisciplinary work, while allowing the student to focus on the early Middle Ages, the High Middle Ages, the Renaissance, or the Baroque. The series of medieval and early modern courses in the program provides the foundation for the major and prepares students for advanced work within the individual disciplines. On the upper-division level, students may choose course work in specific areas of History, Comparative Literature, English, French, German, Italian, Spanish, and Latin, philosophy and religion, arts and language, and political thought. In addition, each student may elect to complete a senior thesis on a selected aspect of medieval and/or early modern culture.

Career Alternatives. The major in Medieval and Early Modern Studies is a liberal arts degree providing excellent preparation for the rigors of professional schools as well as careers in law, museology, journalism, and teaching.

Medieval and Early Modern Studies

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 24
Medieval Studies 20A, 20B, 20C 12
Three additional courses chosen from: Art History 1B, 1C; Comparative Literature 2, 10A, 10B, 10C, 10D, 10E; English 10A, 46A; German 48; History 4A, 4B; Humanities 1*, 9; Philosophy 21, 22 12
Language proficiency is a desideratum. Courses in Latin and other European languages are strongly recommended, particularly for students planning to pursue graduate studies in the medieval or early modern field.

Depth Subject Matter 44
In consultation with the undergraduate adviser, students select a total of eleven courses from the following disciplines with at least three courses each from the medieval and early modern periods.
Art History 155, 156, 178A, 178B, 178C, 179B, 190B, 190C
Classics 110
Comparative Literature 139, 164A, 164B, 164C, 166A, 180*
Dramatic Art 156A
English 111, 113A, 113B, 115, 117, 122, 150A, 153*, 165*, 185A*, 188*, 189*
French 115, 116, 117A, 118B, 141*
German 101A, 112*, 120, 121, 122, 124*, 131, 134*, 160
History 102B, 102D, 121A, 121B, 121C, 122, 125, 130A, 130B, 131A, 131B, 131C, 132, 135, 136, 139A, 144A, 148A, 151A, 151B, 190B, 190C
Italian 105, 112, 113, 114, 115A, 115B, 115C, 115D, 118, 139B, 140, 141
Latin 100N, 101, 102, 103, 104, 105, 106, 108, 109, 110N, 111, 112, 114, 115, 116, 125
Medieval Studies 130A, 130B, 190
Music 121*, 124A, 124B
Philosophy 105, 145, 168, 170, 172
Political Science 115, 116, 118A
Religious Studies 102, 115, 130*
Spanish 130, 133N, 134A, 134B, 142*

Total Units for the Major 68
* Prior approval by Undergraduate Adviser necessary.

Major Adviser. _____

Minor Program Requirements:

UNITS

Medieval and Early Modern Studies..... 24

The minor in Medieval and Early Modern Studies is a coherent program of interdisciplinary study. Medieval Studies units may be taken in one or more of the traditional fields of concentration, including art, history, literature, music, national languages, philosophy, political theory, and religious studies. Courses must be upper-division with at least two courses each from the medieval and early modern periods. Students may also select a minor with a thematic emphasis.

Although there is no foreign language requirement for the minor, knowledge of Latin or a modern European language is recommended.

The minor must be designed in consultation with the Undergraduate Adviser.

Minor Adviser. _____

Courses in Medieval Studies (MST)

Lower Division Courses

20A. Early Medieval Culture (4)
Lecture—3 hours; discussion—1 hour. Readings (in translation) in early medieval culture, such as the Codes of Justinian, the *Confessions of Saint Augustine*, *The Consolation of Philosophy* of Boethius, *Beowulf*, the *Nibelungenlied*, and *The Song of Roland*. GE credit: ArtHum, Wrt.—I. (I.) Roddy

20B. The Culture of the High Middle Ages (4)
Lecture—3 hours; discussion—1 hour. Readings (in translation) in the culture of the high Middle Ages, such as the *Summa Theologica* of Thomas Aquinas, *The Chronicles of Froissart*, *The Canterbury Tales* of Chaucer, and *The Divine Comedy* of Dante. GE credit: ArtHum, Wrt.—II. (II.) Roddy

20C. The Late Medieval and Early Modern Period (4)
Lecture—3 hours; discussion—1 hour. The great transformations that created the modern world: Constitutional Government, the Hundred Years' War, the

Black Death, and the Peasants' Revolts, the Renaissance, Reformation and Counter-Reformation, and the Baroque. GE credit: ArtHum, Wrt.—II. (II.)

98. Directed Group Study (1-5)
(P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

130A. Special Themes in Medieval Cultures (4)
Lecture—3 hours; discussion—1 hour. Each offering concentrates on an interdisciplinary aspect of medieval culture in the Middle East and Europe: the idea of the hero, mysticism, urban development. Extensive readings focused on medieval source material. May be repeated for credit. GE credit: ArtHum, Wrt.

130B. Special Themes in Renaissance Culture (4)
Lecture—3 hours; discussion—1 hour. Each theme illuminates an interdisciplinary aspect of Renaissance culture in the eastern and western hemispheres: exploration, medical pathology, daily life, baroque culture. Immersion in source material from 1500-1650. May be repeated for credit. GE credit: ArtHum, Wrt.

190. Senior Thesis (4)
Seminar—4 hours. Prerequisite: senior standing and major in Medieval Studies. Preparation of a research paper dealing with a selected aspect of medieval culture, under supervision of three members of the Committee in Charge.—I, II, III. (I, II, III.)

197T. Tutoring in Medieval Studies (1-4)
Seminar—2 hours. Prerequisite: courses 20A and 20B; upper division standing; consent of instructor and chairperson of curriculum committee. Tutoring in Medieval Studies 20A and 20B, including leadership in small discussion groups affiliated with the course. May be repeated for credit for a total of 6 units. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Meteorology

See Atmospheric Science, on page 169.

Mexican-American (Chicano) Studies

See Chicana/Chicano Studies, on page 188.

Microbiology

See Microbiology, on page 411; Medical Microbiology, on page 400; Microbiology (A Graduate Group), on page 413; and Pathology, Microbiology, and Immunology (PMI), on page 525.

Microbiology

(College of Biological Sciences)

Douglas C. Nelson, Ph.D., Chairperson of the Department

Department Office. 357 Briggs Hall
(530) 752-2626; *http://microbiology.ucdavis.edu*

Faculty

Primary Department Members

Scott C. Dawson, Ph.D., Assistant Professor
Wolf-Dietrich Heyer, Ph.D., Professor
Neil Hunter, Ph.D., Associate Professor
Michele M. Igo, Ph.D., Associate Professor
Stephen C. Kowalczykowski, Ph.D., Distinguished Professor
Su-Ju Lin, Ph.D., Associate Professor
John C. Meeks, Ph.D., Professor
Lorena Navarro, Ph.D., Assistant Professor
Douglas C. Nelson, Ph.D., Professor
Rebecca Parales, Ph.D., Professor
Martin L. Privalsky, Ph.D., Professor
John R. Roth, Ph.D., Distinguished Professor
Kazuhiro Shiozaki, Ph.D., Professor
Mitchell H. Singer, Ph.D., Professor
Valley J. Stewart, Ph.D., Professor
Lifeng Xu, Ph.D., Assistant Professor

Secondary Department Members
Sean Burgess, Ph.D., Associate Professor
Jodi Nunnari, Ph.D., Professor
Ted Powers, Ph.D., Professor

Secondary Department Members

Sean Burgess, Ph.D., Associate Professor
Jodi Nunnari, Ph.D., Professor
Ted Powers, Ph.D., Professor
Irwin H. Segel, Ph.D., Distinguished Professor

Emeriti Faculty

Stanley W. Artz, Ph.D., Professor Emeritus
Paul Baumann, Ph.D., Professor Emeritus
John L. Ingraham, Ph.D., Professor Emeritus
JaRue S. Manning, Ph.D., Professor Emeritus
David Pratt, Ph.D., Professor Emeritus
Chester W. Price, Ph.D., Professor Emeritus
Merna R. Villarejo, Ph.D., Professor Emerita
Mark L. Wheelis, Ph.D., Senior Lecturer Emeritus

Affiliated Faculty

Karen L. Gerhart, Ph.D., Lecturer
Eric D. Mann, Ph.D., Lecturer

The Major Program

Microbiology is the branch of biology that deals with bacteria, yeasts and other fungi, algae, protozoa, and viruses. These microorganisms are ubiquitous in nature and play a crucial role in areas such as agriculture, biotechnology, ecology, medicine, and veterinary science. The field of microbiology contributes to areas of fundamental inquiry such as biochemistry, cell biology, evolution, genetics, molecular biology, pathogenesis, and physiology. The ease and power of simultaneous genetic and biochemical analysis of microbes led to the emergence of the new disciplines of molecular biology and molecular genetics, and spawned the new industry of biotechnology.

The Program. The Microbiology Undergraduate Program offers Bachelor of Science and Bachelor of Arts degrees in the College of Biological Sciences. Both degrees are designed to provide students with quantitative skills and knowledge across the breadth of Biological Sciences, while maintaining a focus on the biology of microorganisms. The B.S. degree offers more training in mathematics, biochemistry and laboratory methodology; the A.B. degree incorporates more exposure to the liberal arts. The choice of a major program and its suitability for particular career options should be discussed with a major adviser.

Career Alternatives. A bachelor's degree in microbiology serves as the foundation for advanced study in microbiology, entry into the professional schools of all health sciences, or immediate employment in biotechnology, health care and food science industries.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**44-56**
Biological Sciences 2A-2B-2C	14
Chemistry 2A-2B	10
Chemistry 8A-8B or 118A-118B-118C	6-12
Mathematics* 17A-17B or 21A-21B	8
Physics 1A-1B or 7A-7B-7C	6-12
*Mathematics 16A-16B accepted to fulfill this requirement only for transfer students admitted prior to fall 2013.	
Depth Subject Matter	**36-43**
Biological Sciences 101, 102, 103	10
Microbiology 102, 102L, 105, 105L, 140	16
Microbiology 162 or Pathology, Microbiology, and Immunology 128	3-4
Three additional courses from Food Science and Technology 104; Medical Microbiology 115, 116, 130, 188; Microbiology 115, 120, 150, 155L, 170; Pathology, Microbiology, and Immunology 126, 126L, 127; Plant Pathology 120, 130, 148, 150; Soil Science 111; Statistics 100, 102; Viticulture and Enology 128	7-13
Total Units for the Major	**80-99**

B.S. Major Requirements:

	UNITS
Preparatory Subject Matter	**55-65**
Biological Sciences 2A-2B-2C	14
Chemistry 2A-2B-2C	15
Chemistry 8A-8B or 118A-118B-118C	6-12
Mathematics* 17A-17B-17C or 21A-21B (21C recommended)	8-12
Physics 7A-7B-7C	12
*Mathematics 16A-16B-16C accepted to fulfill this requirement only for transfer students admitted prior to fall 2013.	
Depth Subject Matter	**47-51**
Biological Sciences 101, 102, 103, 104	13
Statistics 100 or 102	4
Molecular and Cellular Biology 120L	6
Microbiology 102, 102L, 105, 105L	13
Two courses from Microbiology 140, 150, or 170	6
Microbiology 162 or Pathology, Microbiology, and Immunology 128	3-4
Two courses from Food Science and Technology 104; Microbiology 115, 120, 140, 150, 155L, 170, Pathology, Microbiology, and Immunology 127; Soil Science 111	6-9
Total Units for the Major	**106-120**

Master Adviser. John C. Meeks in 209 Briggs

Honors and Honors Program. John C. Meeks

Teaching Credential Subject Representative. John C. Meeks; see the Teaching Credential/M.A. Program on page 114.

Graduate Study. The Graduate Group in Microbiology offers programs of study and research leading to the M.S. and Ph.D. degrees.

Strong preference is given to doctoral applicants. The group offers study in general microbiology, microbial physiology, microbial genetics, molecular mechanisms of microbial regulation, molecular mechanisms of microbial pathogenesis, immunology, virology, and recombinant DNA technology. For information on the graduate study and undergraduate preparation for the program contact a graduate adviser or the Chairperson of the Group.

Related Courses. The offerings of the Department of Microbiology are augmented by courses in Food Science and Technology; Medical Microbiology; Molecular and Cellular Biology; Pathology, Microbi-

ology, and Immunology; Plant Pathology; and Soil Science.

Faculty of the Department of Microbiology also teach or participate in the following courses: Biological Sciences 2A, 101 and 104.

Courses in Microbiology (MIC)

Lower Division Courses

10. Natural History of Infectious Diseases (3)
Lecture—3 hours. Topics in the natural history of infectious diseases principally affecting humans. Introduction to infectious microbial agents, ecology, epidemiology, and induction of disease. Focus on diseases of a contemporary nature. For students not majoring in the biological sciences. Not open for credit to students who have completed course 101 or course 102. GE credit: SciEng.—III. (III.) Mann

91. Introduction to Research (1)
Seminar—1 hour. Prerequisite: Biological Sciences 1A or 2A or consent of instructor. Discussion of faculty research focusing on the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members. May be repeated three times for credit. (P/NP grading only.)—III. (III.) Lin, Xu

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

100. Chemical and Biological Weapons (3)
Lecture/discussion—3 hours. Prerequisite: upper division standing. Ancient and modern history of chemical and biological weapons; mechanism of action; tactical and strategic uses; riot-control agents; international legal constraints; disarmament and nonproliferation; genomics and the future. Not offered every year. GE credit: SciEng or SocSci.—Wheelis

101. Introductory Microbiology (5)
Lecture—4 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, or 2A and Chemistry 2B (Chemistry 2B may be taken concurrently). Survey of microorganisms emphasizing their interactions with humans and diseases. Topics include microscopy, survey of various microbes, the immune system, food microbiology, microbial pathogens, and mechanisms of disease transmission. Designed for students requiring microbiology for professional schools. Not open for credit to students who have completed course 102 or 102L.—I, II, III. (I, II, III.) Mann, Navarro

102. General Microbiology (4)
Lecture—4 hours. Prerequisite: Biological Sciences 1A or 2A, and Chemistry 8B or 118B (may be taken concurrently). Survey of the biology of microorganisms. Topics include microbial structure, physiology, genetics, and evolution; virology; environmental microbiology; the immune system; and microbial pathogens and disease transmission. In combination with course 102L, fulfills the Microbiology requirement for professional schools. Not open for credit to students who have completed course 101.—I, III. (I, III.)

102L. General Microbiology Laboratory (3)
Lecture/laboratory—7 hours. Prerequisite: course 102 (may be taken concurrently); consent of instructor. Restrictions on Enrollment: Introduction to principles and laboratory methods in microbiology. Designed for students continuing in microbiology or using microorganisms as tools for the study of genetics and biochemistry. In combination with course 102, fulfills the microbiology requirement for professional schools. Due to the heavy demand for this class, students must fill out a petition in order to be considered for enrollment. The petition will be available on the Section of Microbiology website. Only two units of credit allowed to students who have completed course 101.—I, III. (I, III.) Igo, Nelson

105. Microbial Diversity (3)
Lecture—3 hours. Prerequisite: course 102, Biological Sciences 102; Biological Sciences 103 recommended. Survey of the major groups of microorganisms emphasizing diversity of energy metabolism, morphology, evolution, and natural history. Survey of the major groups of microorganisms emphasizing diversity of energy metabolism, morphology, evolution, and natural history. Students who completed course 105 in 2005 or earlier received five units of credits for this lecture/laboratory course. If these students wish to repeat the class, they must enroll in both course 105 (lecture) and course 105L (laboratory) for a total of six units of credit.—II. (II.) Dawson, Parales

105L. Microbial Diversity Laboratory (3)
Laboratory—9 hours (8 hours scheduled lab periods; 1 hour during open laboratory). Prerequisite: courses 102, 102L, 105 (may be taken concurrently), Biological Sciences 102; Biological Sciences103 recommended. Isolation and characterization of microbial strains from various habitats. Includes methods for determination of evolutionary relationships among groups. Due to the heavy demand for this class, students must fill out a petition in order to be considered for enrollment. The petition will be available on the Section of Microbiology website. Not open for credit to students who completed course 105 in 2005 or earlier.—II. (II.) Dawson, Parales

115. Recombinant DNA Cloning and Analysis (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101 or equivalent. Cloning and analysis of recombinant DNA, with emphasis on Escherichia coli host-vector systems. DNA-modifying enzymes; vectors and their use; manipulation and expression of insert DNA; polymerase chain reaction; and sequence annotation. Graduate students see course 215. Not offered every year.—I. (I.) Xu

120. Microbial Ecology (3)
Lecture—3 hours. Prerequisite: course 105, Biological Sciences 102 or 105. Interactions between nonpathogenic microorganisms and their environment, emphasizing physiological and metabolic characteristics of various groups and their adaptation to and modification of specific habitats. Not offered every year.—III. (III.) Nelson

140. Bacterial Physiology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 103 (103 may be taken concurrently), or Biological Sciences 101, 105; Microbiology 102 recommended. Fundamentals of bacterial growth and bacterial responses to environmental stresses. Topics will include carbon and nitrogen regulation, growth rate control, post-exponential growth, and motility and chemotaxis. Not open for credit to students who have completed course 130A.—I. (I.) Meeks, Singer

150. Bacterial Genetics (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101; 102 or 105; Microbiology 102 recommended. Molecular genetics of enterobacteria and their viruses. Isolation of mutants; genetic exchange and mapping; complementation; suppression; transposons; gene expression and regulation; and genomics. Examples will illustrate applications to molecular cloning of recombinant DNA, and to the study of bacterial pathogenesis.—II. (II.) Stewart

155L. Bacterial Physiology Lab (4)
Lecture/discussion—1 hour; laboratory—8 hours. Prerequisite: course 140 or 150, 102L, consent of instructor. Physiology and genetics of bacteria. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction studies of control of enzyme synthesis by induction, repression, and catabolite repression. Not offered every year.—III. (III.) Singer

162. General Virology (4)
Lecture—4 hours. Prerequisite: Biological Sciences 102 or 105. Integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication and genetics. Only three units to students who have completed Pathology, Microbiology, and Immunology 128.—II. (II.) Falk, Manning

170. Yeast Molecular Genetics (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101 and 102; course 102 or 140 (may be take concurrently) strongly recommended. Survey of the genetics, cell biology and technologies in yeasts and related lower eukaryotes. Topics include diversity of yeasts; cell structure; metabolism; cell cycle; genetic approaches and genomics; gene expression; yeasts as models to study higher eukaryotes; and contemporary techniques.—III. (III.) Shiozaki

190C. Undergraduate Research Conference (1)
Discussion—1 hour. Prerequisite: upper division standing and consent of instructor, course 199 concurrently. Presentation and critical discussion of staff research activities: designed for advanced undergraduate students. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

191. Introduction to Research for Advanced Undergraduates (1)
Seminar—1 hour. Prerequisite: Biological Sciences 1A or 2A or consent of instructor. Discussion of faculty research focusing on the biochemistry, genetics, and cell biology of microorganisms, along with ways undergraduates can participate in research projects of faculty members. May be repeated three times for credit. (P/NP grading only.)—III. (III.) Lin, Xu

192. Internship (1-12)
Internship—3-36 hours. Technical and/or professional experience on or off campus. Supervised by a member of the Microbiology Section faculty. (P/NP grading only.)

194H. Microbiology Honors Research (2)
Independent study—6 hours. Prerequisite: senior standing; eligibility for college honors; completion of six units of 199 in microbiology; consent of section. Continuation of an individual microbiological research project culminating in writing of a senior thesis under a faculty director. (P/NP grading only.)—I, II, III. (I, II, III.)

197T. Tutoring in Microbiology (1-12)
Prerequisite: upper division standing and consent of instructor. Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)—I, II, III. (I, II, III.)

Graduate Courses

200A. Biology of Prokaryotes (3)
Lecture—3 hours. Prerequisite: course 102 or the equivalent. Intended for first year graduate students in microbiology and closely related fields. Overview of prokaryotic biology, with emphasis on phylogeny, physiology, and diversity of bacteria. Not offered every year.—I. (I.)

200B. Advanced Bacteriology (3)
Lecture—3 hours. Prerequisite: course 200A. Intended for first year graduate students in microbiology and closely related fields. Advanced topics in phylogeny, physiology, and diversity of bacteria. Not offered every year.—II. (II.)

201L. Advanced Microbiology Laboratory Rotations (5)
Laboratory—15 hours. Prerequisite: course 200A (may be taken concurrently). Two five-week assignments in microbiology research laboratories. Individual research problems with emphasis on

methodological/procedural experience and experimental design. May be repeated two times for credit.—I, II. (I, II.)

210. Molecular Mechanisms in Microbial Pathogenesis (3)
Lecture—3 hours. Prerequisite: course 105 or Veterinary Microbiology 127 and course 162 or Veterinary Microbiology 128 or the equivalent. Study of the molecular mechanisms involved in cytopathogenesis of higher eukaryotic organisms. Emphasis on the alteration or inhibition of cellular metabolism and function by bacteria and animal viruses. Not offered every year.

215. Recombinant DNA (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 103 or the equivalent. Application of recombinant DNA technology to modern problems in biology, biochemistry, and genetics, emphasizing molecular cloning strategies, choice of vectors, preparation of insert DNA, and selection procedures.—I. (I.) Privalsky

250. Biology of Yeasts (5)
Lecture—3 hours; discussion—2 hours. Prerequisite: Biological Sciences 102, 103; course 102, 102L; course 215 recommended. Survey of the genetics, physiology, metabolism, regulatory mechanisms, structure, cell biology, ecology and diversity of yeasts and related organisms. Not offered every year.

260. Bacterial Genetic Regulatory Mechanisms (3)
Lecture/discussion—3 hours. Prerequisite: general knowledge of nucleic acid biochemistry and bacterial genetics. Analysis at the molecular level of genetic regulation in selected bacterial systems. Specific systems discussed will include the following types of regulation: control of transcription initiation and termination; translational controls; tRNA modification effects; autoregulation; control circuits in bacterial viruses; supercontrols. Not offered every year.

262. Advanced General and Molecular Virology (3)
Lecture—3 hours. Prerequisite: graduate standing. Advanced integrated presentation of animal, bacterial, and plant viruses, including their structure, modes of regulation, expression and replication, and effects on host cells and organisms. Offered in alternate years.—II. Luciw

263. Principles of Protein–Nucleic Acid Interactions (3)
Lecture—3 hours. Prerequisite: advanced graduate standing and completion of one year of basic graduate course work in biochemistry, biophysics, chemistry, genetics, microbiology, or molecular biology. Physical basis of protein–nucleic acid interaction. Topics include nucleic acid recognition by proteins, thermodynamics of protein–nucleic acid stability, and kinetics of binding process for both non-specific and sequence-specific nucleic acid binding proteins. Emphasis on systems that represent paradigms in protein–nucleic acid interactions. Not offered every year. Not offered every year.—Kowalczykowski

274. Seminar in Genetic Recombination (1)
Seminar—1 hour. Prerequisite: graduate standing; consent of instructor. Biochemical and genetic aspects of genetic recombination in prokaryotes and eukaryotes. Mechanisms of recombination and biochemical and genetic characteristics of recombination proteins. Proteins include DNA strand exchange, DNA helicases, and Holliday junction resolving proteins. May be repeated for credit. Not offered every year. (S/U grading only.)—Kowalczykowski

275. Seminar in DNA Repair and Recombination (1)
Seminar—1 hour. Prerequisite: consent of instructor; graduate standing in Microbiology or closely related field. Review and discussion of current research and literature in DNA repair and recombination with presentations by individual students and invited speakers. May be repeated for credit. (S/U grading only.)—(I, II, III.) Heyer

276. Advanced Concepts in DNA Metabolism (3)
Lecture—3 hours. Prerequisite: Molecular and Cellular Biology 221C or Genetics 201C or equivalent course recommended. DNA damage checkpoints, homologous recombination, and meiotic recombination. An advanced treatment of the clinical and current literature to discuss emerging principles and current models in these research areas. Offered in alternate years.—III. Heyer

290C. Advanced Research Conference (1)
Discussion/conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities. Designed for advanced graduate students. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

291. Selected Topics in Microbiology (1)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Current progress in microbiology and cellular and molecular biology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

292. Seminar in Bacterial Physiology and Genetics (1)
Seminar—1 hour. Prerequisite: consent of instructor, graduate standing in microbiology or closely related field. Review and discussion of current research and literature in bacterial physiology and genetics, with presentations by individual students. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)—I, II, III. (I, II, III.)

299. Research (1-12)
(S/U grading only.)—I, II, III. (I, II, III.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Microbiology (A Graduate Group)

Glenn Young Ph.D., Chairperson of the Group

Group Office. 3143 Tupper Hall (Medical Microbiology and Immunology)
(530) 752-0262

Faculty

Enoch P. Baldwin, Ph.D., Associate Professor *(Molecular and Cellular Biology)*
Peter A. Barry, Ph.D., Professor *(Comparative Medicine)*
Stephen W. Barthold, Ph.D., Professor *(Pathology, Microbiology, and Immunology)*
Nicole Baumgarth, Ph.D., Associate Professor *(Center for Comparative Medicine)*
Andreas Baumler, Ph.D., Professor *(Medical Microbiology and Immunology)*
Charles L. Bevins, Ph.D., Professor *(Medical Microbiology and Immunology)*
Linda F. Bisson, Ph.D., Professor *(Viticulture and Enology)*
Barbara A. Byrne, Ph.D., Assistant Professor *(Pathology, Microbiology, and Immunology)*
R. Holland Cheng, Ph.D., Professor *(Molecular and Cellular Biology)*
Kiho Cho, Ph.D., Associate Professor *(Surgery and Pediatric Regenerative Medicine)*
Bruno B. Chomel, Ph.D., Professor *(Population Health and Reproduction)*
Patricia A. Conrad, Ph.D., Professor *(Pathology, Microbiology, and Immunology)*
James S. Cullor, Ph.D., Professor *(Population Health and Reproduction)*
Satya Dandekar, Ph.D., Professor *(Medical Microbiology and Immunology)*
Scott Dawson, Ph.D., Assistant Professor *(Microbiology)*
Katherine DeRiemer, Ph.D., Associate Professor *(Medical Microbiology & Immunology)*
Jonathan Eisen, Ph.D., Professor *(Evolution & Ecology and Medical Microbiology & Immunology)*
Marc Facciotti, Ph.D., Assistant Professor *(Biomedical Engineering)*
Julia Fan, Ph.D., Assistant Professor *(Biological & Agricultural Engineering)*
Angela Gelli, Ph.D., Assistant Professor *(Pharmacology and Toxicology)*
Laurel J. Gershwin, Ph.D., Professor *(Pathology, Microbiology, and Immunology)*
Ronald P. Hedrick, Ph.D., Professor *(Medicine and Epidemiology)*
Wolf-Dietrich Heyer, Ph.D., Professor *(Microbiology)*
Neil Hunter, Ph.D., Associate Professor *(Microbiology)*
Michele M. Igo, Ph.D., Associate Professor *(Microbiology)*
Stephen C. Kowalczykowski, Ph.D., Professor *(Microbiology)*
Hsing-Jien Kung, Ph.D., Professor *(Biological Chemistry)*
Rance B. LeFebvre, Ph.D., Professor *(Pathology, Microbiology, and Immunology)*
Johan Leveau, Ph.D., Assistant Professor *(Plant Pathology)*
Su-Ju Lin, Ph.D., Associate Professor *(Microbiology)*
Bo Liu, Ph.D., Associate Professor *(Plant Biology)*
Frank Loge, Ph.D., Associate Professor *(Civil and Environmental Engineering)*
Paul Luciw, Ph.D., Professor *(Medical Pathology)*
Shirley Luckhart, Ph.D., Associate Professor *(Medical Microbiology and Immunology)*
Maria Marco, Ph.D. Assistant Professor *(Food Science & Technology)*
John C. Meeks, Ph.D., Professor *(Microbiology)*
Christopher J. Miller, Ph.D., Professor *(Pathology, Microbiology, and Immunology)*
David A. Mills, Ph.D., Associate Professor *(Viticulture and Enology)*
Lorena Navarro, Ph.D., Assistant Professor *(Microbiology)*
Douglas C. Nelson, Ph.D., Professor *(Microbiology)*
Thomas W. North, Ph.D., Professor *(Center for Comparative Medicine)*
Jodi Nunnari, Ph.D., Professor *(Molecular and Cellular Biology)*
Bennie I. Osburn, Ph.D., Professor *(VM: Pathology, Microbiology, and Immunology)*
Rebecca E. Parales, Ph.D., Associate Professor *(Microbiology)*
Niels C. Pedersen, Ph.D., Professor *(Medicine and Epidemiology)*
Edmund R. Powers, Ph.D., Professor *(Molecular and Cellular Biology)*
Martin L. Privalsky, Ph.D., Professor *(Microbiology)*
Kathryn Radke, Ph.D., Professor *(Animal Science)*
Pamela Ronald, Ph.D., Professor *(Plant Pathology)*
John R. Roth, Ph.D., Professor *(Microbiology)*
Michael A. Savageau, Ph.D., Professor *(Biomedical Engineering)*
Kate M. Scow, Ph.D., Professor *(Land, Air and Water Resources)*
Barbara L. Shacklett, Ph.D., Associate Professor *(Medical Microbiology and Immunology)*
Kazuhiro Shiozaki, Ph.D., Professor *(Microbiology)*
Mitchell H. Singer, Ph.D., Professor *(Microbiology)*
Jay V. Solnick, M.D., Ph.D., Professor *(Internal Medicine)*
Jeffrey L. Stott, Ph.D., Professor *(Pathology, Microbiology, and Immunology)*
Michael Syvanen, Ph.D., Professor *(Medical Microbiology and Immunology)*
Jose V. Torres, Ph.D., Professor *(Medical Microbiology and Immunology)*
Renee Tsolis, Ph.D., Assistant Professor *(Medical Microbiology and Immunology)*
Bart Weimer, Ph.D., Professor *(Population Health & Reproduction)*
Stefan Wuertz, Ph.D., Professor *(Civil and Environmental Engineering)*
Lifeng Xu, Ph.D., Assistant Professor *(Microbiology)*

Tilahun D. Yilma, Ph.D., Professor
(Pathology, Microbiology, and Immunology)
Glenn M. Young, Ph.D., Associate Professor
(Food Science and Technology)

Affiliated Faculty

Patrick S. C. Leung, Ph.D., Associate Adjunct Professor *(Internal Medicine)*
Woutrina Miller, Ph.D., Assistant Adjunct Professor *(VM: Pathology, Microbiology, and Immunology)*
Earl T. Sawai, Ph.D., Assistant Adjunct Professor *(Medical Pathology)*
Ellen E. Sparger, Ph.D., Adjunct Professor *(VM: Medicine and Epidemiology)*

Graduate Study. The Graduate Group in Microbiology offers study and research leading to the M.S. and Ph.D. degrees. Strong preference is given to doctoral applicants. The group offers study in modern molecular approaches to microbiological problems. Areas of research span fundamental, applied, and pathogenic microbiology, including bacterial and viral pathogenesis, eukaryotic microbiology, microbial genomics and genetics, microbial physiology and development, microbial ecology and environmental microbiology, cancer biology, and bioengineering and bioremediation. For information on the graduate study and undergraduate preparation for the program contact a graduate adviser or the Chairperson of the Group.

Graduate Advisers. P. Barry *(Center for Comparative Medicine)*, S. Dawson *(Microbiology)*, L.F. Bisson *(Viticulture and Enology)*, K.L. Radke *(Animal Science)*, R.E. Parales *(Microbiology)*, E.E. Sparger *(Vet Med: Medicine)*

Courses in Microbiology (MIB)

Graduate Courses

290C. Advanced Research Conference (1)
Discussion/conference—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and critical discussion of staff research activities. Designed for advanced graduate students. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

299. Research (1-12)
Research under the guidance of dissertation committee. (S/U grading only.)

Middle East/South Asia Studies

(College of Letters and Science)

Sudipta Sen, Ph. D., Program Director

Program Office. 156 Everson Hall
(530) 754-4926; *http://mesa.ucdavis.edu*

Committee in Charge

Ali Anooshahr, Ph.D. (*History)*
Omnia El Shakry, Ph.D. (*History)*
Susan Miller, Ph.D. (*History)*
Sudipta Sen, Ph.D. (*History)*
Vaidehi Ramanathan, Ph.D. (*Linguistics)*
Baki Tezcan, Ph.D. (*History)*

The Major Program

The major in Middle East/South Asia Studies offers a comparative understanding of the Middle East and South Asia, regions that have been integrally linked for centuries by trade, migration, exchange of scientific, mathematical, political and philosophical ideas, religion, literature, and art. These regions are connected in the modern period through similar and shared experiences of colonial rule, decolonization and nationalist struggle. Many of the major languages of the region, such as Arabic, Hindi-Urdu, Bengali, Persian, Punjabi, and Turkish, have heavily influenced each other. Religion is a significant force in the region binding people to sacred geographies, scripts, and genealogies. As opposed to presentist approaches which reproduce traditional area studies defined for strategic geopolitical interests, the Middle East/South Asia Studies major rethinks area studies through critical, comparative, historical, and sociological analyses of global interconnections of people, products, ideas, and processes. The major in Middle East/South Asia Studies offers students a unique opportunity to study exchanges, complementarities, and correspondences between these regions in religion, family structures, gender relations, media, literature and film, history, anthropology, law, political economy, international relations, development, urbanism, science and technology, diaspora studies, and other themes.

Programs, Internships, and Career Alternatives. Many internship opportunities are available for the Middle East/South Asia Studies major and minor, consult with your advisor.

Middle East/South Asia Studies Abroad Program. University of California Education Abroad Program. More information can be found at *http://eap.ucop.edu/* and *http://summer-abroad.ucdavis.edu/*

A.B. Major Program Requirements:

UNITS

Preparatory Subject Matter 8-38
History 6, 8 8
Two years (or the equivalent) of Arabic, Hebrew, or Hindi/Urdu (other Middle East/South Asia Studies regional languages accepted with petition). Arabic 1, 2, 3, 21, 22, 23; Hebrew 1, 2, 3, 21, 22, 23; Hindi/Urdu 1, 2, 3, 21, 22, 23 30

Depth Subject Matter 40-42
Middle East/South Asia Studies 100 4
Middle East/South Asia Studies 180 4
Two courses from Anthropology 142; Comparative Literature 166; History 113, 190A, 190B, 190C, 193A, 193B; Political Science 135, 136; Religious Studies 160, 162; Women's Studies 178A, 184 8
Two courses from Anthropology 145; History 102Q, 196A, 196B; Religious Studies 170; Women's Studies 178B 8
Additional Electives from Core Course list (below) 16-18

Total Units for Major 48-80

Core Course List:

Anthropology 142, 145; Arabic 1, 2, 3, 21, 22, 23; Art History 1E, 155; Asian American Studies 150F, 189E; Classics 1; Comparative Literature 53B, 53C, 166; Hebrew 1, 2, 3, 21, 22, 23; Hindi/Urdu 1, 2, 3, 21, 22, 23; History 102Q, 102R, 113, 190A, 190B, 190C, 193A, 193B, 196A, 196B; Middle East/South Asia Studies 92, 98, 99, 180, 192, 198, 199; Music 129B, 148; Political Science 135, 136; Religious Studies 21, 23, 60, 65C, 68, 160, 161, 162, 170; Women's Studies 178A, 178B, 184.
Note: With prior consultation with an advisor, students can petition in the Program Committee in advance to accept other elective courses toward the major program, including language courses.
Note: While some courses are identified as fulfilling more than one requirement, a given course can only fulfill one such requirement.
Restriction: No more than six units of MSA 92, 98, 99, 192, 198, 199 may be offered in satisfaction of the major requirements.

Major advisor. Consult the Middle East/South Asia Studies Program in 173 Kerr Hall (530) 754-4926 or the Middle East/South Asia Studies website at *http://mesa.ucdavis.edu*.

Minor Program Requirements:

UNITS

Middle East/South Asia Studies..... 20-24
Middle East and South Asian Studies 100 4
Choose one course from: Anthropology 142; Asian American Studies 189E; Comparative Literature 166; History 113, 190A, 190B, 190C, 193A, 193B; Music 129B; Religious Studies 160, 161, 162; Women's Studies 178A, 184 4
Choose one course from: Anthropology 145; Asian American Studies 150F, 189E; History 102Q, 196A, 196B; Music 129B, 148; Religious Studies 168, 170; Women's Studies 178B 4
Additional Electives from Core Course list for major (above) 8-12
Note: With prior consultation with an adviser, students can petition the Program Committee in advance to accept other elective courses toward the minor program. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.
Note: With prior consultation with an adviser, students can petition the Program Committee to accept more than four units of Middle East and South Asian Studies 192, 198, and/or 199 towards the minor program.
Note: While some courses are identified as fulfilling more than one requirement, a given course can only fulfill one such requirement.

Minor Adviser. Consult the Middle East/South Asia Studies Program in 156 Everson Hall (530) 754-4926 or the Middle East/South Asia Studies website at *http://mesa.ucdavis.edu*.

Courses in Middle East and South Asian Studies (MSA)

Lower Division Courses

92. Internship in Middle East/South Asia Studies (3-15)
Internship. Prerequisite: consent of instructor. Work experience on and off campus in all subject areas offered as part of the ME/SA Studies program. Internship supervised by a member of the ME/SA faculty. May be repeated for credit up to 15 units. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor (P/NP grading only.)

Upper Division Courses

100. Middle East and South Asia: Comparative Perspectives (4)
Lecture—3 hours; extensive writing. Ethnographic and historical points of intersection and divergence in various aspects of the Middle East and South Asia in precolonial, colonial, and postcolonial societies. Anthropological, historical, and theoretical debates surrounding the region. GE credit: ArtHum, Div, Wrt.

112. History of South Asian Islam (4)
Lecture—3 hours; discussion—1 hour. Comparative study of Muslim communities of South Asia. Commonalities in cultural identity and historical experience. Rise and spread of Islam, comparative history of Islamic Empires, colonial rule, and post-colonial nationalism. Not offered every year.—II. Sen

150. Women and Islamic Discourses (4)
Lecture/discussion—4 hours. Prerequisite: Women's Studies 50 or comparable course. Introduction to the debates/discourses about women and Islam. Transformations in debates/discourses in colonial and postcolonial periods in the Middle East & South Asia. Comparative study of debates/discourses on family, work, law, sexuality, religion, comportment, human rights, feminist and religious movements. Not offered every year. (Same course as Women's Studies 185.)—Joseph

180. Topics in Middle East and South Asian Studies (4)
Lecture—3 hours; extensive writing. Comparative perspective on the Middle East and South Asia. Topics may include modernity, religious traditions, colonialism, subalternity and social movements, gender and sexuality, history and memory, science and development, ritual and performance, public culture, diasporas. May be repeated one time for credit. GE credit: ArtHum, Div, Wrt.—I, II, III. (I, II, III.)

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: course 100. Supervised internship on and off campus in the area of Middle East and South Asia Studies. May be repeated for up to 12 units of credit. (P/NP grading only.)

194H. Special Study for Honors Students (1-5)
Prerequisite: open only to majors of senior standing who qualify for honors program; consent of instructor. Independent study of a problem in Middle East/South Asian studies involving the writing of an honors thesis.—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Prerequisite: course 100. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: course 100. (P/NP grading only.)

Military Science

(College of Letters and Science)

Reserve Officers' Training Corps (ROTC), Army

Joseph A. Harvey, Lt. Col., Chairperson of the Department, Professor of Military Science

Department Office. 125 Hickey Gymnasium (530) 752-5211

Faculty

Major Jason D. Hioco, Assistant Professor

Program of Study

The Military Science Department offers hands-on training in management and leadership. The program stresses the following Army Values: loyalty, duty, respect, selfless-service, honor, integrity, and personal courage. The program also stresses leadership dimensions as taught in the classes. Also stressed are current events, national and international politics, military affairs, ethics training, and human relations with emphasis on eliminating racial and gender discrimination. Management and leadership are taught using the U.S. Army as a model. Military skills (such as drill and ceremony, map reading, and squad tactics) are taught to the extent necessary to create an environment where students can enter leadership positions and apply theories taught in the classroom. Students learn by doing. The program assists students in all academic fields to prepare for positions of leadership in military or civilian careers.

The department offers two program tracks: *(1)* a purely academic track; *(2)* a pre-commissioning track for those desiring a commission in the U.S. Army. The academic track entails no obligation to the military and is open to all students. Students pursuing the academic track do not wear a uniform or otherwise participate in extra-curricular activities designed as part of the pre-commissioning process. Activities for all students include the Ranger Club (a club designed for adventure activities such as rappelling, white-water rafting, orienteering, and patrolling) and intramural sports teams.

Students who desire a commission in the U.S. Army participate in both the academic portion of the program and in the leadership laboratories and extra-curricular activities designed to enhance their leadership and technical skills. They wear uniforms to leadership laboratories and selected classes and become ROTC cadets. Students may be cadets in the lower division courses without incurring a military obligation. Students participating in the upper division pre-commissioning program incur a military obligation. See below for details. Extra-curricular activities for cadets include an intercollegiate sports team (Ranger Challenge), the university color guard, a military honor society, and opportunities to participate in field training exercises.

Department Programs

Students are enrolled in Military Science under one of two programs.

Four-Year Program

There is no military obligation associated with attendance in lower division courses. Students are enrolled in the basic course (lower division) for the first two years on a voluntary basis. Admission to the advanced course (upper division) is by application from second-year lower division students who meet the academic, physical, and military aptitude requirements. Qualified veterans can enter the advanced course immediately because of their military service experience, upon approval by the Department Chairperson.

Juniors receive $450 subsistence per month, and Seniors $500 per month, after executing a contract agreeing to complete the courses and accept a commission in the U.S. Army upon graduation. During the course, all Military Science text books, uniforms and equipment are provided without cost. Students are given leadership development experience at the Leader Development and Assessment Course (LDAC) between their third and fourth years of the course. Emphasis is on individual participation, leadership development and the capability to function effectively in positions of significant responsibility.

Two-Year Program

The two-year program is for students, including graduate students, who have not attended lower division Military Science classes. In lieu of lower division courses an applicant attends a six-week summer program, Leaders Training Course (LTC) which is voluntary and carries no military obligation. Applicants are paid and transportation costs covered. Applications are accepted at anytime prior to the student's junior year; graduate students are also accepted. All other provisions explained above for the upper division course apply to the two-year program.

Scholarship Program

The U.S. Army offers four-, three-, and two-year Active Duty scholarships, two-year Reserve Forces Duty, and two-year Dedicated National Guard scholarships to students planning to attend or attending UC Davis. The U.S. Army ROTC scholarship package pays tuition and educational fees. Also included in all scholarships is a flat rate of $1200 per year for textbooks.

The Army Reserve Officers' Training Corps four-year Active Duty merit scholarships are awarded to qualified high school seniors in a national competition each year. A deadline of 10 January is set for submission of the four-year scholarship application. As high school seniors, students compete for the scholarship by submitting their complete application at *http://www.goarmy.com/rotc/* or contact UC Davis, Department of Military Science at (530) 754-6707.

The three-year Active Duty and two-year Reserve Forces Duty scholarships are awarded to college students who are already attending UC Davis or transferring from a junior college to UC Davis. Students apply for and are awarded these Army scholarships through the Military Science Department.

Leadership Laboratory

During the course of the school year, two hours per week are spent conducting practical exercises. Classes emphasize adventure activities including offense, defense and patrolling techniques, weapons familiarization, rappelling, rope bridging, obstacle courses, leadership reaction course, and land navigation. All cadets are required to attend leadership laboratories for practical leadership experience and to prepare for attendance at LDAC, held at Fort Lewis, Washington.

Academic Credit

College of Agricultural and Environmental Sciences. The Bachelor of Science degree in agriculture requires the completion of 180 units. Military Science courses are counted in the unit allowance for electives.

College of Biological Sciences. The Bachelor of Science degree requires the completion of 180 units. Military Science courses are counted in the allowance for electives.

College of Engineering. Military Science units are acceptable toward the requirements for the Bachelor of Science degree to the extent of the unrestricted elective units available in the curriculum being followed.

College of Letters and Science. The Bachelor of Arts degree requires the completion of 180 units. Military Science courses are counted in the allowance for electives.

School of Veterinary Medicine. The number of Military Science units acceptable toward the Bachelor of Science degree in Veterinary Medicine is on an individual program basis approved by the Dean of the School. Graduates with the D.V.M. degree may apply for direct commission in the United States Army Veterinary Corps.

Aerospace Studies (Air Force)

The Air Force Reserve Officer's Training Corps (AFROTC) is an educational program providing training in leadership, management, communications and military proficiency on college and university campuses. It also provides an opportunity to obtain a commission as a second lieutenant in the Air Force and enter the active duty forces after you complete a bachelor's or a graduate degree. The skills you acquire will become valuable assets for any subsequent career you choose.

The program is normally four years long, but a flexible design allows students to complete the curriculum in as little as two years. Undergraduate scholarships are available, but are not necessary for participation. Until you accept a scholarship or enter your junior year of the program, you have no obligation to join the Air Force. There are no costs for AFROTC uniforms, books, or classes.

UC Davis students have the option of taking the Air Force program on the UC Berkeley or CSU Sacramento campus.

Qualifications

Freshmen/Sophomore applicants must:

- Be full-time college students in good academic standing
- Have good moral character
- Be in strong physical condition
- Be at least 14 years old

Additionally, Juniors/Seniors/Scholarship recipients must:

- Be United States citizens or in the process of applying for citizenship
- Be 18 years old (or 17 years old with consent of parent or guardian)
- Pass the Air Force Officer Qualifying Test
- Pass a medical examination
- Be under the age of 31 at time of graduation (may be waived)

Scholarships

Opportunities for four-year and three-year undergraduate scholarships are better than ever. Scholarships cover the full cost of tuition, books and required fees at the University of California and are available for eligible high school seniors. It also includes $300-$500 monthly stipend during the

school year. If you are a junior or senior in high school and plan on attending a college or university in Northern California, you can write, call or visit the local AFROTC detachments for a scholarship application. Applications are also available from local Air Force recruiters or your high school guidance counselors.

All scholarships are merit-based and consider a variety of factors: cumulative GPA, class standing, SAT/ACT scores, academic awards/achievements, leadership ability, athletic involvement, extracurricular activities, community service and letters of recommendation. A personal interview with an Air Force officer is also part of the application process. Prior to activating a scholarship, students must meet AFROTC medical and physical fitness standards. All scholarships must be used at an accredited college or university that offers AFROTC on campus or through cross-registration. The program is available at more than 1,000 universities and colleges nationwide.

If you are already in college, contact our office directly and apply for enrollment into AFROTC as a cadet. Three- and two-year full tuition scholarships are available for all academic majors, especially scientific and technical majors such as engineering, atmospheric science, math, computer science, and physics. GPA Scholarship requirements for nontechnical majors are slightly higher. Applicants are primarily evaluated on their leadership ability and academic performance.

Challenging Careers

All commissioned officers enter the Air Force as second lieutenants for a 4-year active duty service commitment. Pilots and navigators serve longer commitments, based on training requirements. Once on active duty, you'll be given instant responsibility in one of 32 primary career fields. Opportunities to fly are better than ever. Whether you are piloting the F-22 fighter, supervising 150 aircraft maintainers on the flightline, or caring for sick personnel in the emergency room, you will be rewarded knowing that you are making a difference.

Air Force ROTC is offered through the Aerospace Studies departments at California State University Sacramento and U.C. Berkeley. Scholarships (including tuition, book allowance, and stipend) are available for qualified students. Students may enroll and attend one course per semester at the U.C. Berkeley or CSU Sacramento campus at no cost. Topics covered in AFROTC courses include Basic Military knowledge (1-credit), Military History (1-credit), Leadership Training (3-credits), and U.S. National Security Affairs and Preparation for Active Duty (3-credits). Additional components of the AFROTC program include 2 hours per week of fitness activities, 2 hours per week of Leadership Lab, and a 4-week Summer Field Training between the Sophomore and Junior years. Upon completion of the program and granting of 4-year degree, students will commission as Second Lieutenants in the United States Air Force. To be eligible for AFROTC, applicants should be a full time student and meet additional fitness, GPA, testing, and other requirements. Interested students, please contact their department of choice:

For CSU Sacramento: *http://www.csus.edu/afrotc*
(916) 278-7315; *det088@maxwell.af.mil*

For U.C. Berkeley: *http://airforcerotc.berkeley.edu*
(510) 642-3572; *airforce@berkeley.edu*

Naval ROTC

Department of Naval Science
152 Hearst Gymnasium, UC Berkeley
Berkeley, CA 94270-3640
(510) 642-3551; *http://navyrotc.berkeley.edu*

UC Davis students may participate in the Navy and Marine Corps ROTC program at UC Berkeley. The program is 4 years long and includes courses and weekly professional development laboratories (drill) at UC Berkeley. Students normally compete for national scholarships as high school seniors, although interested students may enroll as freshmen or sophomores and compete for scholarships based on successful participation in the program. A student who satisfactorily completes an ROTC program and is awarded a degree from UC Davis receives an active duty commission as a Second Lieutenant in the U.S. Marine Corps or an Ensign in the U.S. Navy.

Navy option students take the following courses:

Freshman year:

NS 1 Introduction to Naval Science
NS 2 Sea Power and Maritime Affairs

Sophomore year:

NS 3 Leadership and Management
NS 10 Naval Ship Systems I

Junior year:

NS 12A Navigation and Naval Operations I
NS 12B Navigation and Naval Operations II

Senior year:

NS 401 Naval Ship Systems II
NS 412 Leadership and Ethics

In lieu of NS401, NS10, NS12A and NS12B, Marine Corps students participate in Marine Seminars and complete MA154, History of Littoral Warfare and MA20, Evolution of Warfare (or a designated equivalent).

Scholarship students are required to complete a number of other courses at Davis, including one year each of calculus, physics, and English, and one quarter each of computer science, and military history or national security policy.

Interested students should contact the Department of Naval Science at UC Berkeley at the address above to obtain information and apply.

Courses in Military Science (MSC)

Lower Division Courses

11. Roles and Organization of the U.S. Army (1)
Lecture/discussion—2 hour. Constitutional and legal basis of the Army, organization and strategic roles in time of war and peace. Surveys the duties and responsibilities of junior Army Officers studied in the context of current problem.—IV. (IV.) Hioco

12. Introduction to Tactical Military Leadership (1)
Lecture—1 hours. Prerequisite: lower division standing. Military leadership fundamentals to include setting direction, problem-solving, presenting briefs, and using effective writing skills. Basic military tactics, orienteering and land navigation. Dimensions of leadership values, attributes, skills, and actions.—II. (II.)

13. Introduction to Basic Military Operations (1)
Lecture—1 hour. Prerequisite: lower division standing. Basic military tactical theories and their application at the individual and squad level. Military tactical operations and basic military first aid.—III. (III.)

14A. Introduction to Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: lower division standing and consent of instructor. Personal and organizational leadership skills introduced in leadership laboratory. Extensive supervised leadership experiences conducted in a military environment. Basic military skills necessary to function in a leadership role. (P/NP grading only.)—I. (I.)

14B. Introduction to Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: lower division standing; consent of instructor. Continuation of development of leadership and military skills introduced in course 14A. Emphasis on the role of the individual, the basic organizational element of the Army, the squad. Supervisory controls reduced as students gain capabilities. (P/NP grading only.)—II. (II.)

14C. Introduction to Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: lower division standing; consent of instructor. Development of skills required for promotion to junior non-commissioned officer level. Chain of command from company through individual levels. Interrelationship of squad and platoon organization. (P/NP grading only.)—III. (III.)

21. Military History, Study of Battles (2)
Lecture—2 hours. Prerequisite: course 22B or consent of instructor. Application of the nine Principles of War to key battles in American and World history. Tactics on a strategic and operational level. Evaluation of leadership and decision-making processes of key leaders.—III. (III.)

22A. Innovative Team Leadership (2)
Lecture—2 hours. Prerequisite: lower division standing or consent of instructor. Leadership values, attributes and theories. Use of basic military skills such as land navigation and squad operations to enhance understanding of the Army. Types of military briefings. Practice in interpersonal skills. Presentation of a briefing.—I. (I.)

22B. Foundations of Tactical Leadership (2)
Lecture—2 hours. Prerequisite: course 22A or consent of instructor. Leadership of tactical teams in complex operating environment. Self-assessment of leadership style. Basic military skills: terrain analysis, patrolling and operations orders. Dynamics of adaptive leadership in the context of military operations.—II. (II.)

24A. Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: courses 14A, B and C, enrolled in course 22A or consent of instructor. Develop and practice personal military leadership skills in extensive supervised leadership labs. Cadets perform basic military skills, improve on troop leading procedures and lead subordinates in tactical situations. Begin with drill and ceremony, land navigation and individual movement techniques. (P/NP grading only.)—I. (I.)

24B. Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: courses 14A, B and C, enrolled in course 22B or consent of instructor. Development and practice of personal military leadership skills in extensive supervised leadership labs. Performance of basic military skills, improvement on troop-leading procedures, leadership of subordinates in tactical situations. (P/NP grading only.)—II. (II.)

24C. Individual Military Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: courses 14A, B and C, enrolled in course 21 or consent of instructor. Develop and practice personal military leadership skills in extensive supervised leadership labs. Begin with drill and ceremony, land navigation and individual movement techniques. Cadets perform basic military skills, improve on troop leading procedures and lead subordinates in tactical situations. (P/NP grading only.)—III. (III.)

Upper Division Courses

131. Military Leadership and Management (2)
Lecture—2 hours. Prerequisite: upper division standing and consent of instructor. Leadership and management in organizational context. Team dynamics, leadership styles, professional ethics, development of a leadership framework. Management skills for planning, decision making, and organizing developed through definition of problems, development of courses of action, implementation of solutions.—I. (I.)

132A. Advanced Military Operations (2)
Lecture—2 hours. Prerequisite: upper division standing, course 131 or consent of instructor. Military small unit tactical theory as the basis for leadership development. Principles of war, contemporary operating environment, Geneva Law of Land Warfare,

military offensive and defensive operations. Emphasis on development of critical thinking, problem solving, and communication skills.—II. (II.)

132B. Applied Leadership (2)
Lecture—2 hours. Prerequisite: upper division standing, course 132A or consent of instructor. Military small unit tactical theory and application as basis for leadership development. Application of leadership styles and skills to complete problem-solving exercises and the development of an adaptable framework applicable to a variety of shifting environments and situations.—III. (III.)

134A. Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite: upper division standing, course 131 or consent of instructor. Small unit tactical operations serve as the basis for enhancement of leadership performance through tactical application. Assessment of leadership attributes, skills, and actions through participation in a variety of leadership roles in problem-solving exercises. (P/NP grading only.)—I. (I.)

134B. Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite: upper division standing, course 132A or consent of instructor. Small unit tactical operations as the basis for enhancement of leadership performance through tactical application. Assessment of leadership attributes, skills, and actions through participation in a variety of leadership roles in problem-solving exercises. (P/NP grading only.)—II. (II.)

134C. Adaptive Tactical Leadership (0.5)
Laboratory—2 hours. Prerequisite: upper division standing, course 132B or consent of instructor. Small unit tactical operations are taught, serve as basis for students exploration, development. Serve in variety of leadership roles in which leadership attributes, skills, actions are closely assessed and developed while they are faced with series of problem solving exercises. (P/NP grading only.)—III. (III.)

141. Ethical Leadership(2)
Lecture—2 hours. Prerequisite: upper division standing; consent of instructor. Direct influence of leaders on individual motivation and group processes. The complexities of balancing moral, legal, and ethical obligations while applying fundamental business principles in determining the best possible outcome from competing solutions.—I. (I.)

142. Military Law (2)
Lecture—2 hours. Prerequisite: division standing and course 141, or consent of instructor. The United States Constitution and the Military Justice System. Basic law of war, with an emphasis on issues that might arise on the battlefield or during a national emergency.—II. (II.) Connelly

143. U.S. Army Management Systems (2)
Lecture—2 hours. Prerequisite: division standing and course 142 or consent of instructor. Leadership and management, focusing on four management systems: planning, organizing, leading and controlling. Practical methodologies for assessing management decisions while balancing competing ethical, economic, infrastructure and future growth trade-offs.—III. (III.)

144A. Military Training Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: upper division standing, course 141 or consent of instructor. Enhancement of student leadership performance through practical application. Small unit military tactical operations as the basis for the student exploration and development. (P/NP grading only.)—I. (I.)

144B. Military Training Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: upper division standing, course 142 or consent of instructor. Enhancement of student leadership performance through practical application. Small unit military tactical operations serve as the basis for student exploration and development. (P/NP grading only.)—II. (II.)

144C. Military Training Leadership Skills (0.5)
Laboratory—2 hours. Prerequisite: upper division standing, course 143 or consent of instructor. Enhancement of student leadership performance through practical application. Small unit military tactical operations as the basis for student exploration and development. (P/NP grading only.)—III. (III.)

191. Special Studies in Military Science (2)
Independent study—6 hours. Prerequisite: consent of department chair, and courses 131, 132A, 132B, 141, 142, 143. Intensive examination of one or more special problems in military science. Possible areas of study include leadership dimensions, principles of war, air-land battle imperatives, military strategy, the operational art and professional ethics, May be repeated two times for credit when topic differs. (P/NP grading only.)

Molecular Biosciences

See Veterinary Medicine, School of, on page 517.

Molecular and Cellular Biology

(College of Biological Sciences)

Michael E. Dahmus, Ph.D., Chairperson of the Department

Department Office. 149 Briggs Hall
(530) 752-3611; *http://www.mcb.ucdavis.edu*

Faculty

Primary Members

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Enoch Baldwin, Ph.D., Associate Professor
Nigel D. Browning, Ph.D., Professor
(Chemical Engineering and Materials Science)
Sean M. Burgess, Ph.D., Associate Professor
Kenneth C. Burtis, Ph.D., Professor
Judy Callis, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Frederic L. Chedin, Ph.D., Assistant Professor
R. Holland Cheng, Ph.D., Professor
Bruce W. Draper, Ph.D., Assistant Professor
JoAnne Engebrecht, Ph.D., Professor
Carol A. Erickson, Ph.D., Professor
Marilynn E. Etzler, Ph.D., Professor
Oliver Fiehn, Ph.D., Professor
Andrew Fisher, Ph.D., Professor *(Chemistry)*
Christopher S. Fraser, Ph.D., Assistant Professor
Charles S. Gasser, Ph.D., Professor
Kenneth B. Kaplan, Ph.D., Professor
John A. Kiger, Ph.D., Professor
Ian Korf, Ph.D., Assistant Professor
J. Clark Lagarias, Ph.D., Professor
Julie A. Leary, Ph.D., Professor
Francis J. McNally, Ph.D., Associate Professor
Richard W. Michelmore, Ph.D., Professor *(Vegetable Crops; Medical Microbiology and Immunology)*
Diana G. Myles, Ph.D., Professor
Jeanette E. Natzle, Ph.D., Associate Professor
Jodi Nunnari, Ph.D., Professor
Edmund R. Powers, Ph.D., Professor
Raymond L. Rodriguez, Ph.D., Professor
Lesilee S. Rose, Ph.D., Professor
Jonathan M. Scholey, Ph.D., Professor
Henning Stahlberg, Ph.D., Associate Adjunct Professor
Daniel A. Starr, Ph.D., Assistant Professor
Michael D. Toney, Ph.D., Professor *(Chemistry)*
David K. Wilson, Ph.D., Professor

Secondary Section Members

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Stephen C. Kowalczykowski, Ph.D., Distinguished Professor
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Brian Mulloney, Ph.D., Professor
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Larry N. Vanderhoef, Ph.D., Professor
Martin Wilson, Ph.D., Professor

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Sterling Chaykin, Ph.D., Professor Emeritus
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Richard H. Falk, Ph.D., Professor Emeritus
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Melvin M. Green, Ph.D., Professor Emeritus
Robert D. Grey, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award
Jerry L. Hedrick, Ph.D., Professor Emeritus
Distinguished Graduate Mentoring Award
Mark G. McNamee, Ph.D., Professor Emeritus
Carl W. Schmid, Ph.D., Professor Emeritus
Irwin H. Segel, Ph.D., Distinguished Professor Emeritus
Che-Kun J. Shen, Ph.D., Professor Emeritus
Larry R. Sprechman, Ph.D., Senior Lecturer Emeritus

Affiliated Faculty

Benjamin F. Edwards, Ph.D., Lecturer
Kenneth L. Hilt, Ph.D., Lecturer
Judith A. Kjelstrom, Ph.D., Academic Coordinator/ Lecturer
Leann L. Lindsay, Ph.D., Lecturer
Larry Z. Morand, Ph.D., Lecturer
Mark F. Sanders, Ph.D., Lecturer

Molecular and Cellular Biology offers three major programs: Biochemistry and Molecular Biology, Cell Biology, and Genetics.

The Biochemistry and Molecular Biology Major Program

The Biochemistry and Molecular Biology major introduces students to the chemistry of living organisms and the experimental techniques that are used to probe the structures and functions of biologically important molecules. Students who enjoy both chemistry and biology and who are comfortable with quantitative approaches to problem solving will find this major a rewarding field of study.

The Program. The biochemistry and molecular biology program begins with the four-course, upper division common curriculum that provides an introduction to the principles of biochemistry, genetics, and cell biology. Majors then take a comprehensive and rigorous laboratory course to familiarize them with the most important aspects of biochemical research. Additional upper division courses in biochemistry and molecular biology examine detailed aspects of these subjects. Students are also required to take courses in other biological sciences and a full year of physical chemistry.

Career Alternatives. The biochemistry and molecular biology program provides a solid scientific background for students seeking a research, teaching, or service career in the life sciences. Positions are open to biochemists in bio-medical, biotechnological, pharmaceutical, agricultural research and chemical industries. Also, university-affiliated research laboratories, hospital laboratories, and government-sponsored research facilities provide employment opportunities. The major provides excel-

lent preparation for advanced study in graduate or professional schools.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 49-53
- Biological Sciences 2A-2B-2C 14
- Chemistry 2A-2B-2C or 2AH-2BH-2CH ... 15
- Mathematics* 17A-17B-17C or 21A-21B (21C recommended) 8-12
- Physics 7A-7B-7C 12
- *Mathematics 16A-16B-16C accepted to fulfill this requirement only for transfer students admitted prior to fall 2013.

Depth Subject Matter 57-62
- Biological Sciences 101, 102, 103, 104 13
- Chemistry 118A-118B-118C or 128A-128B-128C, 129A-129B 12-13
- Chemistry 107A-107B 6
- Statistics 100 or 130A-130B 4-8
- Molecular and Cellular Biology 120L, 121, 123, 124 16
- Restricted Electives 6
  - 6 units of upper division courses in biological sciences or chemistry relevant to the student's interest chosen in consultation with the adviser. Students are encouraged to obtain additional laboratory experience; however, no more than 3 units of 192, 193 or 199 research may be counted toward restricted elective units.

Total Units for the Major 106-115

Master Adviser. C.S. Gasser

Advising Center for the major is located in 156 Briggs (530) 752-9032.

Graduate Study. See Biochemistry and Molecular Biology (A Graduate Group), on page 173.

The Cell Biology Major Program

The Cell Biology major program provides students with a comprehensive understanding of the cell, the basic structural and functional unit of all living organisms.

The Program. To understand living organisms, the biologist must understand the cell. Hence, cell biology lies at the core of the biological sciences. Students taking this major gain a solid foundation in biological principles. The major emphasizes how cellular organization and function contribute to the development, maintenance and reproduction of adult organisms. The major illustrates the ways in which principles derived from the physical sciences, genetics, biochemistry, molecular biology and physiology are integrated in the study of living cells and emphasizes the experimental nature of the study of cell biology.

Career Alternatives. The major provides an excellent background for students wishing to enter postgraduate and professional programs in biological, health sciences or veterinary sciences; for students pursuing careers involving teaching or research in the biological sciences; for students interested in careers in the biotechnological or pharmaceutical industries; or for students interested in careers related to the administrative, legal or commercial aspects of biomedical science.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 55-65
- Biological Sciences 2A-2B-2C 14
- Chemistry 2A-2B-2C 15
- Mathematics* 17A-17B-17C or 21A-21B (21C recommended) 8-12
- Physics 7A-7B-7C 12
- Chemistry 8A-8B or 118A-118B-118C 6-12
- *Mathematics 16A-16B-16C accepted to fulfill this requirement only for transfer students admitted prior to fall 2013.

Depth Subject Matter 42-43
- Biological Sciences 101, 102, 103, 104 13
- Statistics 100 or 130A-130B 4-8
- Molecular and Cellular Biology 140L 5
- Two courses from Molecular and Cellular Biology 143, 144, or 145 6
- Molecular and Cellular Biology 121 or 161 3
- Molecular and Cellular Biology 150 and 150L, or 163 and 164 5-6
- Select at least 10 additional units from the following: Chemistry 107A, 107B; Evolution and Ecology 100, 150; Medical Microbiology 188; Microbiology 101, 102, 150, 170; Molecular and Cellular Biology 120L, 123, 124, 126, 138, 143, 144, 145, 148, 150 and 150L, 158, 160L, 162, 163, 164, 178, 182, 191; Neurobiology, Physiology, and Behavior 100, 101, 103, 112, 131, 160, 161; Pathology, Microbiology, and Immunology 126, 126L, 128; Plant Biology 111 and 111D, 113 and 113D; Plant Sciences 152. No more than 4 units of research (193, 194H, 199) may be used for credit in this category 10

Total Units for the Major 101-116

Master Adviser. D.G. Myles

Advising Center for the major is located in 156 Briggs (530) 752-0202.

Graduate Study. See Cell and Developmental Biology (A Graduate Group), on page 182.

The Genetics Major Program

The Genetics major provides a broad background in the biological, mathematical, and physical sciences basic to the study of heredity, gene expression and evolution. The major is sufficiently flexible to accommodate students interested in the subject either as a basic discipline in the biological sciences or in terms of its applied aspects such as biotechnology, medicine, and agriculture.

The Program. The genetics program begins with the four-course, upper division core curriculum that provides an introduction to the principles of genetics, biochemistry, and cell biology. Students then take additional upper division courses in specialized areas of modern genetics including gene expression, evolution, development, human genetics and genomics, as well as a laboratory course in the principles of genetics. Additional upper division courses in biological sciences, as well as internship/research coursework can be chosen to fulfill required elective units.

Career Alternatives. The genetics degree provides suitable preparation for a wide variety of careers, including teaching, research, work with biotechnology companies, medicine, and all the health sciences. It is also an excellent background for students wishing to continue their education in a graduate program, a teacher-training program, medical school, veterinary school, or other professional schools.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 55-65
- Biological Sciences 2A-2B-2C 14
- Chemistry 2A-2B-2C or 2AH-2BH-2CH ... 15
- Chemistry 8A-8B or 118A-118B-118C 6-12
- Mathematics* 17A-17B-17C or 21A-21B (21C recommended) 8-12
- Physics 7A-7B-7C 12
- *Mathematics 16A-16B-16C accepted to fulfill this requirement only for transfer students admitted prior to fall 2013.

Depth Subject Matter 48-49
- Biological Sciences 101, 102, 103, 104 13
- Molecular and Cellular Biology 160L, 164 7
- Evolution and Ecology 100 4
- One course from Molecular and Cellular Biology 161 (recommended) or 121 3
- Two courses from Molecular and Cellular Biology 162, 163, 182 or Evolution and Ecology 102 6-7
- Statistics 100 or 130A-130B 4-8
- Restricted Electives 11
  - Upper division courses in genetics or other fields relevant to the student's interest chosen in consultation with the adviser. No more than 4 units of 192, 193, 198, or 199 may be used for credit in this category.

Total Units for the Major 103-118

Master Adviser. J.E. Natzle

Advising Center for the major is located in 156 Briggs Hall (530) 752-0202.

Graduate Study. See Genetics (A Graduate Group), on page 312.

Courses in Molecular and Cellular Biology (MCB)

Lower Division Courses

10. Introduction to Human Heredity (4)
Lecture—3 hours; discussion—1 hour. Topics in human heredity and human gene structure and function, including the genetic basis of human development, causes of birth defects, mental retardation, genetic diseases, sexual determination, development, and behavior. GE credit: SciEng.—II, III. (III.) Rannala, Sanders

99. Special Study (1-5)
Independent study—3-15 hours. Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

120L. Biochemistry Laboratory (6)
Laboratory—10 hours; lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: Biological Sciences 103 (may be taken concurrently). Introduction to laboratory methods and procedures employed in studying biochemical processes. Designed for students who need experience in the use of biochemical techniques as laboratory tools.—I, II, III. (I, II, III.) Dinesh-Kumar, Fairclough, Hilt, Lagarias, Lindsay, B. Liu, L. Morand, Nunnari, Theg

121. Molecular Biology of Eukaryotic Cells (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101 and 103. Structure, expression, and regulation of eukaryotic genes. Chromosome structure and replication; gene structure, transcription, and RNA processing; protein synthesis and translation control; development, immune system, and oncogenes. Not open for credit to students who have completed Molecular and Cellular Biology 161.—II, III. (II, III.) Burgess, Gasser, Harmer, Powers

123. Behavior and Analysis of Enzyme and Receptor Systems (3)
Lecture—3 hours. Prerequisite: Biological Sciences 103. Introduction to the principles of enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include simultaneous equilibria, chemical and steady-state kinetics, allosteric enzymes, mulitreactant systems, enzyme assays, membrane transport and computer-assisted simulations and analyses.—I, III. (I, III.) Fraser, Wilson

124. Macromolecular Structure and Function (4)
Lecture—4 hours. Prerequisite: Biological Sciences 103, Chemistry 107B, 118C. An in-depth investigation into protein and nucleic acid structure and thermodynamics and how these properties influence their biological functions. Key examples of important functional classes of these molecules will be examined. Not open for credit to students who have completed course 122 or Chemistry 108.—I. (I, III.) Baldwin, Browning

126. Plant Biochemistry (3)
Lecture—3 hours. Prerequisite: Biological Sciences 103 or 105. The biochemistry of important plant processes and metabolic pathways. Discussion of

methods used to understand plant processes, including use of transgenic plants. (Same course as Plant Biology 126.)—II. (II.) Callis, Tian

138. Undergraduate Seminar in Biochemistry (1)
Seminar—1 hour. Prerequisite: Biological Sciences 103. Discussion of the historical developments of modern biochemistry or current major research problems. May be repeated two times for credit when topic differs. (P/NP grading only.)—I, II, III. (I, II, III.) Callis, Gasser

140L. Cell Biology Laboratory (5)
Lecture—2 hours; laboratory—6 hours; discussion—1 hour. Prerequisite: Biological Sciences 104 (may be taken concurrently). Exercises illustrating the principles of cell biology with emphasis on light microscopy.—II. (II.) Kaplan

142. Advanced Cell Biology: Contractile and Motile Systems (4)
Lecture—3 hours; term paper. Prerequisite: Biological Sciences 102, 104 (may be taken concurrently); Mathematics 16B. Advanced cell biology with emphasis on molecular, biophysical and cellular properties of contractile and motile systems.

143. Cell and Molecular Biophysics (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 103, 104. Physical chemical principles by which molecules form living, moving, reproducing cells. Physical nature of cytoplasm; molecular structure/bonding in macromolecules, macromolecular assemblies and protein machines. Physical techniques and modeling of cytoskeletal polymer-motor dynamics and function during intracellular transport, mitosis and motility.—(I.) Scholey

144. Mechanisms of Cell Division (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 104. The molecules and mechanisms that allow eukaryotic cells to coordinate cell growth, DNA replication, segregation of chromosomes and cell division.—II. (II.) McNally

145. Assembly and Function of Cell Signaling Machinery (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101, 102, 104. Molecular basis of cell signaling, including positioning of cellular machinery, components of various signaling pathways, and downstream effects of signaling on cell adhesion, cell differentiation, and programmed cell death.—III. (III.) Erickson

148. Undergraduate Seminar in Cell Biology (2)
Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.)

150. Developmental Biology (4)
Lecture—4 hours. Prerequisite: Biological Sciences 101 and concurrent enrollment in course 150L. Analysis of the mechanistic basis for animal development with a focus on experimental evidence and the relevant fundamental experimental strategies. Fertilization and early development, morphogenesis and patterning, cell differentiation, regulation of cell proliferation and tissue growth.—I. (I.) Armstrong, Edwards

150L. Laboratory in Developmental Biology (1)
Laboratory—3 hours. Prerequisite: concurrent enrollment in course 150. Experiments using live embryos and histological slide preparations of developing embryos will be used to investigate and illustrate the basic mechanisms of animal development. (P/NP grading only.)

158. Undergraduate Seminar in Developmental Biology (2)
Seminar—2 hours. Prerequisite: upper division standing in the biological sciences or a related discipline. Student reports on current topics in cell biology with emphasis on integration of concepts, synthesis, and state-of-the-art research approaches. Reviews of literature and reports of undergraduate research may be included. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

160L. Principles of Genetics Laboratory (4)
Laboratory—6 hours; lecture—2 hours. Prerequisite: Biological Sciences 101. Laboratory work in basic and molecular genetics including gene mapping and isolation of mutants. Not open for credit to students who have completed Genetics 100L.—I, II, III. (I, II, III.) Kiger, Natzle, Rose, Sanders, Sundaresan

161. Molecular Genetics (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101, Biological Sciences 102 may be taken concurrently. Molecular mechanisms for propagation and expression of the genome in eukaryotic and prokaryotic model organisms. How genetic and molecular tools, both classical and modern, are applied to the study of gene structure, function, and regulation. Not open for credit to students who have completed course 121.—II. (II.) Harmer, Powers

162. Human Genetics (3)
Lecture—3 hours. Prerequisite: course 161 (preferred) or 121, 164. Human molecular genetic variation, molecular basis of metabolic disorders, chromosome aberrations and consequences, analysis of the human genome, and computational techniques of genetic analysis.—I. (I.) Chedin

163. Developmental Genetics (3)
Lecture—3 hours. Prerequisite: course 161 (preferred) or 121, course 164. Current aspects of development genetics. Historical background and current genetic approaches to the study of development of higher animals.—II. (II.) Natzle, L. Rose

164. Advanced Eukaryotic Genetics (3)
Lecture—3 hours. Prerequisite: course 161 or 121. The five basic operations of genetic analysis: mutation, segregation, recombination, complementation, and regulation. Emphasis on the theory and practice of isolating and analyzing mutations, as well as understanding mechanisms underlying both Medelian and epigenetic inheritance.—III. (III.) Burgess

178. Undergraduate Seminar in Molecular Genetics (1)
Seminar—1 hour. Prerequisite: upper division standing, completion of Biological Sciences 101, course 160L, and completion or concurrent enrollment in course 161. Discussion of current topics in molecular genetics to show advanced applications of basic principles and to highlight professional career opportunities. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.) Chedin, Rodriguez

182. Principles of Genomics (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101, course 121 or 161. Fundamentals of genomics, including structural genomics, functional genomics, proteomics, and bioinformatics, focusing on the impact of these disciplines on research in the biological sciences. Social impacts of genomic research.—III. (III.) Korf

190C. Undergraduate Research Conference (1)
Discussion—1 hour. Prerequisite: upper division standing and consent of instructor; concurrent enrollment in course 193 or 199. Presentation and discussion of current research by faculty and students. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

191. Introduction to Research (1)
Seminar—1 hour. Prerequisite: Biological Sciences 102 (may be taken concurrently) or consent of instructor. Various topics in molecular and cellular biology including biochemistry, genetics, and cell biology will be discussed, along with ways undergraduates can participate in research projects of faculty members. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Technical and/or practical experience on and off campus, supervised by a member of the Section of Molecular and Cellular Biology faculty. (P/NP grading only.)

193. Advanced Research (3)
Laboratory—6 hours; discussion—1 hour. Prerequisite: upper division standing, completion of an upper division Molecular and Cellular Biology laboratory course and consent of instructor. Research project carried out under the supervision of a faculty sponsor. Discussion and analysis of results and proposed experiments on a weekly basis with faculty sponsor. May include presentation of a seminar to a research group. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

194H. Research Honors (3)
Independent study—9 hours. Prerequisite: 6 units of course 193 and/or 199 with faculty director; senior standing; GPA of at least 3.250; consent of Section. Honors project. Continuation of an intensive, individual laboratory research project in biochemistry, genetics, or cell biology culminating with the presentation of the work in a written thesis and in a seminar. (P/NP grading only.)

197T. Tutoring in Molecular and Cellular Biology (1-5)
Tutorial—2-6 hours. Prerequisite: upper division standing, completion of course to be tutored, and consent of instructor. Assisting the instructor in one of the section's regular courses by tutoring individual or small groups of students in a laboratory, in voluntary discussion groups, or other voluntary course activities. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III,)

198. Directed Group Study (1-5)
Variable—1-5 hours. Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Independent study—3-15 hours. Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200A. Current Techniques in Cell Biology (2)
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 104 and course 141 or the equivalent courses. Current techniques used in cell biology research including microscopy, spectroscopy, electrophysiology, immunochemistry, histology, organelle isolation, calorimetry, tissue culture and gel electrophoresis. Lectures are presented by experts on each technique, with an emphasis on pitfalls to avoid when using the technique. (Same course as Cell and Developmental Biology 200.) (S/U grading only.)

200B. Current Techniques in Biochemistry (2)
Lecture—2 hours. Prerequisite: Biological Sciences 103 and course 120L or the equivalent. Current techniques used in biochemical research including protein and carbohydrate analyses, immunochemistry, recombinant DNA methods, electrophoretic and chromatographic methods. (S/U grading only.)

200C. Current Techniques in Biophysics (2)
Lecture—2 hours. Prerequisite: graduate standing; Biological Sciences 102 or 104 or the equivalent. Current techniques in biophysics research including diffraction, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electrophysiology. (Same course as Biophysics Graduate Group 200.) (S/U grading only.)

210. Molecular Genetics and Genomics (3)
Lecture/discussion—3 hours. Prerequisite: Biological Sciences 101 and Molecular & Cellular Biology 121, or equivalent. Pass one restricted to graduate students. Emphasizes molecular genetic and genomic approaches to address fundamental biological questions. Introduces and emphasizes the strengths of prokaryotic and eukaryotic model systems and serves as building block for the BMCDB core courses, which use model systems to develop their themes. May be repeated one time for credit.—I. (I.) Engebrecht

211. Macromolecular Structure and Interactions (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102, or the equivalent, or consent of instructor. Pass one restricted to graduate students. Conceptual and quantitative basis for macromolecular structurefunction relationships. Investigation of the paradigm form follows function. Review of key elements of protein, nucleic acid, and membrane structure. Exploration of specific macromolecular associations by analyzing chemical structure and physical-chemical behavior. No credit for students that have taken course 221A.—I. (I.) Baldwin, Segal, Wilson

212. Cell Biology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 104, or equivalent, or consent of instructor. Pass one restricted to graduate students. Analysis of basic processes governing cell organization, division, and transport. Study of the integration and regulation of cell behavior in response to changes in cellular environment. No credit for students that have taken course 221D.—II. (II.) McNally

213. Developmental Biology (3)
Lecture—3 hours. Prerequisite: undergraduate biology course or consent of instructor. Pass one restricted to graduate students. Fundamental principles in embryonic development that guide application of modern cellular and genetic approaches to understand developmental mechanisms. Emphasis on experimental approaches used to critically address scientific questions.—II. (II.) Erickson

214. Molecular Biology (3)
Lecture—3 hours. Prerequisite: course 211, or equivalent, or consent of instructor. Pass one restricted to graduate students. Investigation of the basic cellular processes in prokaryotes and eukaryotes that govern the central dogma of molecular biology (DNA-RNA-protein). No credit for students that have taken course 221C.—III. (III.) Heyer

215. Graduate Reading Course (2)
Discussion—10 hours. Prerequisite: graduate standing or consent of instructor. Pass one restricted to graduate students. Development of critical reading skills through study of major paradigm advances in specialized fields of biochemistry, molecular, cell, and developmental biology. Emphasis on active learning and student participation. Guided analysis of literature and major advances in field of study. May be repeated two times for credit if topic differs.—III. (III.) Kaplan

220L. Advanced Biochemistry Laboratory Rotations (5)
Laboratory—15 hours. Prerequisite: course 221A (may be taken concurrently) and 120L or the equivalent. Two five-week assignments in biochemistry research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated two times for credit.—I, II, III. (I, II, III.) Starr

221B. Mechanistic Enzymology (3)
Lecture—3 hours. Prerequisite: undergraduate level organic and biological chemistry, one course in physical chemistry recommended. Analysis of organic enzyme reaction mechanisms and the exploration of enzyme catalyzed reactions.—I. (I.) Baldwin, Fiehn

221C. Molecular Biology (4)
Lecture—4 hours. Prerequisite: course 221A or the equivalent. Pass 1 restricted to graduate students in biochemistry and molecular biology, microbiology, or genetics. Structure and organization of DNA and chromatin; DNA replication, repair and recombination; transcription and RNA processing; protein biosynthesis and turnover; transcriptional and post-transcriptional control mechanisms; examples from eukaryotic and eubacterial cells, and viruses. (Same course as Genetics 201C.)—III. (III.) Baldwin, H. Chen, Farnham, Fraser, Heyer, Korf, Stewart

241. Membrane Biology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102, 103, 104 or consent of instructor. Advanced topics on membrane biochemistry and biophysics. Relationship of the unique properties of biomembranes to their roles in cell biology and physiology. (Same course as Biophysics 241.)—III. (III.) Longo, Voss

248. Seminar in Cell Biology (2)
Seminar—2 hours. Prerequisite: consent of instructor. Discussion of recent literature on the physical and chemical aspects of organization and function of living systems, topics of current interest in ultrastructure and function of cells. Organizational and functional properties of the molecular and cellular levels of biological systems. May be repeated for credit.—I.

251. Molecular Mechanisms in Early Development (3)
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; introductory background in developmental biology and/or cell biology recommended. Analysis of the early events of development including: germ cells and other stem cells, gametogenesis, meiosis, imprinting, fertilization, genetically-engineered organisms, egg activation and establishment of embryonic polarity with focus on cellular events including gene regulation and cell signaling. Offered in alternate years.—(I.) Draper

252. Cellular Basis of Morphogenesis (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 150. Development of form and structure; morphogenetic movement, mechanisms of cellular motility, cell adhesion, intercellular invasion, interaction of cells and tissues in development. Offered in alternate years.—(II.) Armstrong, Tucker

255. Molecular Mechanisms in Pattern Formation and Development (3)
Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; introductory background in developmental biology and/or genetics recommended. Genetic and molecular analysis of mechanisms that control animal development after fertilization. Establishment of embryonic axes, cell fate and embryonic pattern; induction, apoptosis, tissue patterning. Critical reading of current literature in C.elegans, Drosophila, and mouse genetic model systems. Offered in alternate years.—III. Natzle, Rose

256. Cell and Molecular Biology of Cancer (2)
Lecture—1 hour; term paper. Prerequisite: course in cell or developmental biology (e.g., course 150, 141, 163, or Biological Sciences 104). Analysis at the cellular and molecular levels of the regulation of normal and neoplastic tissue growth; tumor dissemination; identification and characterization of oncogenic agents; characterization of oncogenes and tumor-suppressor genes.—I. (I.) Armstrong

257. Cell Proliferation and Cancer Genes (3)
Lecture—1.5 hours; seminar—1.5 hours. Prerequisite: course 221C and 221D or the equivalent. Genetic and molecular alterations underlying the conversion of normal cells to cancers, emphasizing regulatory mechanisms and pathways. Critical reading of the current literature and development of experimental approaches.—I. (I.) Carraway

258. Seminar in Development (2)
Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit.—II. (II.) Armstrong, Erickson

259. Literature in Developmental Biology (1)
Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in developmental biology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Armstrong, Erickson

263. Biotechnology Fundamentals and Application (2)
Lecture—2 hours. Prerequisite: Biological Sciences 101, 102 and Microbiology 102 or consent of instructor. Must be a graduate student in good standing. Fundamentals of molecular biology and chemical engineering involved in recombinant DNA technology. Topics: principles of rate processes of biological systems, optimization of bioreactors, and issues related to overexpression and production of recombinant molecules. Participation in student-directed team projects.—II. (II.) McDonald, Privalsky, Rodriguez, VanderGheynst

282. Biotechnology Internship (7-12)
Internship—21-36 hours. Prerequisite: graduate standing and consent of instructor. Research at a biotechnology company or interdisciplinary cross-college lab for a minimum of 3 months as part of the Designated Emphasis in Biotechnology Program. (S/U grading only.)—I, II, III. (I, II, III.) Dandekar

290C. Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Presentations and critical discussions of faculty and graduate student research in molecular and cellular biology including biochemistry, genetics, and cell biology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

291. Current Progress in Molecular and Cellular Biology (1)
Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Seminars presented by guest lecturers on subject of their own research activities. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Draper

294. Current Progress in Biotechnology (1)
Seminar—1 hour. Prerequisite: graduate standing or consent of instructor. Seminars presented by guest lecturers on subjects of their own research activities. May be repeated for credit. (Same course as Chemical Engineering 294.) (S/U grading only.)—I, II, III. (I, II, III.) Kjelstrom, McDonald, Rodriguez

295. Literature in Molecular and Cellular Biology (1)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Critical reading and evaluation of current literature in molecular and cellular biology disciplines. Papers will be presented and discussed in detail. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Baldwin, Fisher, Privalsky, Wilson

298. Group Study (1-5)
Variable—1-5 hours. Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
Independent study—3-36 hours. (S/U grading only.)

Professional Course

390. Methods of Teaching (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching biochemistry/genetics/cell biology. Includes analysis of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion and laboratory sections, formulating examinations under supervision of instructor. Participating in the teaching program required for Ph.D. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Molecular, Cellular, and Integrative Physiology (A Graduate Group)

Catherine VandeVoort, Ph.D., Chairperson of the Group

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(Internal Medicine)
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Catherine VandeVoort, Ph.D., Adjunct Professor
(Obstetrics and Gynecology)
Amparo Villablanca, M.D., Associate Professor
(Internal Medicine)
Peter C. Wainwright, Ph.D., Professor
(Evolution and Ecology)
W. Jeffrey Weidner, Ph.D. Professor
(Neurobiology, Physiology, and Behavior)
Robert H. Weiss, M.D., Professor *(Internal Medicine)*
Jonathan Widdicombe, Ph.D., Professor
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Barry W. Wilson, Ph.D., Professor *(Animal Science)*
Dennis W. Wilson, Ph.D., Professor
(VM: Pathology, Microbiology, and Immunology)
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Heike Wulff, Ph.D., Assistant Professor
(Pharmacology)
Clare E. Yellowley, Ph.D., Professor
(VM: Anatomy, Physiology and Cell Biology)
Sarah Yuan, Ph.D., Professor *(Surgery)*
Jie Zheng, Ph.D., Assistant Professor
(Physiology and Membrane Biology)

Emeriti Faculty

Irwin Feinberg, M.D., Professor Emeritus
John M. Horowitz, Ph.D., Professor Emeritus

Graduate Study. The Graduate Group in Molecular, Cellular, and Integrative Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees and participates in joint Ph.D./M.D. and Ph.D./D.V.M. programs. The programs emphasize broad training in the fundamental principles of cellular, molecular, and integrative physiology. For information regarding these programs, address the Program staff person at the Group office.

Graduate Advisers. J. Goldberg (*Neurobiology, Physiology, and Behavior)* J. Widdicombe *(Physiology and Membrane Biology)*

Courses in Molecular, Cellular, and Integrative Physiology (MCP)

(Formerly courses in Physiology)

Graduate Courses

200L. Animal Cell Culture Laboratory (4)
Discussion—2 hours; laboratory—6 hours. Prerequisite: courses in undergraduate biochemistry, cell biology, or general physiology, or consent of instructor. Techniques of cell culture, with emphases on cell physiology and the actions of drugs and toxicants on cultured somatic cells. Design, performance and interpretation of experiments with animal cells in vitro.—II. (II.) B. Wilson, R. Wu

210A. Advanced Physiology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Physiology Ph.D. program, or consent of instructor. Advanced course in general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology. (Same course as Human Physiology 210A.)—I. (I.) Adams

210B. Advanced Physiology (6)
Lecture—5 hours; discussion—1 hour. Prerequisite: Physiology 210A; Physiology Ph.D. program, or consent of instructor. Advanced course on general principles of physiology, surveying homeostasis, cellular and selected topics, and neurophysiology.—II. (II.) Adams

210C. Advanced Physiology (5)
Lecture—5 hours. Prerequisite: doctoral student in the Molecular, Integrative and Comparative Physiology Graduate Group, or consent of instructor. Graduate level instruction in the general principles of physiology and the neural and humoral control of the cardiovascular, renal, respiratory, gastrointestinal, sensory, musculoskeletal, and reproductive systems.—III. (III.) Adams

210L. Physiology Laboratory Rotations (5)
Laboratory—15 hours. One mandatory 10-week rotation and up to two more voluntary rotations. Students will learn techniques and perform experiments related to a particular research problem. At the end of the 10-week period in the laboratory, students will give a short talk and hand in a research paper.—I, II. (I, II.) Widdicombe, Zheng

216. Neurophysiology Literature (3)
Lecture—1 hour; discussion—2 hours. Lectures covering experimental and theoretical methods in studying cell membrane ion channels and the resulting characterization of the physiological functions and structure/function relationships of some of the most important channel types. Discussion of classical and current original papers.—I. (I.)

219. Muscle Growth and Development (3)
Lecture—2 hours; seminar—1 hour. Prerequisite: Biological Sciences 103, Biological Sciences 104 or Molecular and Cellular Biology 150, or consent of instructor. Integration of growth and development of skeletal muscle; morphology, biochemistry, neural control mechanisms, circulatory and nutritional factors. Prenatal and neonatal differentiation of fiber types. Experimental and hereditary myopathies. Offered in alternate years.—III. Bodine, Carlsen

220. General and Comparative Physiology of Reproduction (3)
Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 110, 110L; Biological Sciences 101, 103. Basic phenomena of sexual and asexual reproduction and comparisons of processes in a wide variety of animals; gamete formation, structure, and metabolism; fertilization; neuroendocrine mechanisms in maturation and reproductive cycles; behavioral aspects.—III. (III.) Adams, Berger, Conley

222. Mammalian Gametogenesis and Fertilization (3)
Lecture/discussion—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 121 or the equivalent. Course will emphasize our current understanding of events in mammalian gametogenesis and the fertilization process. Published results, conclusions drawn from these results, and their contribution to our understanding will be discussed.—III. (III.) Berger

230. Advanced Endocrinology (2)
Lecture—2 hours. Prerequisite: Neurobiology, Physiology, and Behavior 130 or the equivalent, and graduate standing. Focus on timely topic of endrocrine research. Critical review of current literature and discussion of future research strategies in the area. May be repeated for credit when topic differs.

231. Neuroendocrinology (3)
Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 110 or the equivalent course in systemic physiology; Neurobiology, Physiology, and Behavior 130 or the equivalent course in endocrinology. Neural-endocrine interactions; neural regulation of the endocrine system, especially in relation to reproduction; the role of hormones and growth factors in sexual differentiation of the brain.

234. Neurophysiological Basis of Neurotoxicology (3)
Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 110 or the equivalent; basic understanding of neurophysiology. Mechanisms of action at the cellular and systemic level of a number of different neurotoxins and toxicants. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. (Same course as Environmental Toxicology 234.)—I. (I.) Lein

242. Biological Rhythms (3)
Lecture—2 hours; lecture/discussion—1 hour. Prerequisite: Neurobiology, Physiology, and Behavior 110 or the equivalent. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; daily, reproductive, and annual periods; shift-work, jet lag and sleep disorders. Offered in alternate years.—(I.) Fuller

255. Physiology of the Stress Response (2)
Lecture/discussion—2 hours. Prerequisite: graduate student status. Definition of Stress; Physiological mechanisms of adaptation to stress; Hormonal control of the systemic stress response; Mechanisms of the cellular stress response; Discussion of current trends in stress physiology and current methods for studying the stress response. (Same course as Animal Biology 255.)—III. (III.) Kueltz

261A. Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/discussion—2 hours. Prerequisite: graduate standing, Neurobiology, Physiology, and Behavior 100 or 112 or the equivalent. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Same course as Neuroscience 261A and Neurobiology, Physiology, and Behavior 261A.) (S/U grading only.)—II. (II.) Ishida

261B. Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/discussion—2 hours. Prerequisite: consent of instructor; course 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Same course as Neuroscience 261B and Neurobiology, Physiology, and Behavior 261B.) (S/U grading only.) Offered in alternate years.—II. Britten

261C. Topics in Vision: Clinical Vision Science (2)
Lecture/discussion—2 hours. Prerequisite: courses 261A and 261B, or consent of instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (Same course as Neuroscience 261C and Neurobiology, Physiology, and Behavior 261C.) (S/U grading only.) Not offered every year.—III. Werner

275. Neurohumoral Regulatory Mechanisms of Thermogenesis (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 104 or the equivalent; Biological Sciences 102 or the equivalent; consent of instructor. Designed for graduate and advanced undergraduate students, this course will examine thermogenic systems in homeotherms (primarily mammals) with respect to regulation (hormonal and central nervous control) and effector mechanisms (basis of heat generation at the target cell).

290. Seminar (1)
Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Research Conference in Physiology (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Presentation and discussion of faculty and graduate student research in physiology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

291B. Seminar in Cellular Mechanisms of Adaptation (1)
Discussion—0.5 hour; seminar—0.5 hour. Prerequisite: Neurobiology, Physiology, and Behavior 100B; Biological Sciences 103; consent of instructor. Review and evaluation of current literature and research in cellular adaptations to the environment. May be repeated for credit when topic differs. (S/U grading only.)

291D. Research Approaches in Physiology (2)
Seminar—2 hours. Prerequisite: graduate standing in Graduate Group in Physiology or consent of instructor. Current research in physiology. Overall design of experiments and particular research areas. (S/U grading only.)—I. (I.) Eiserich, Raybould

293. Current Progress in Physiology (1)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by guest lecturers describing their current research activities. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Professional Courses

300A-300B. Pedagogical Aspects of Physiology in Higher Education (3-3)
Lecture, discussion, or laboratory, or combination. Prerequisite: meet qualifications for teaching assistant in physiology. Participation as a teaching assistant for one quarter in a designated physiology course. Instruction in methods of leading discussion groups, leading laboratory sections, writing and grading quizzes, operation and use of laboratory equipment, and reading and grading laboratory reports. Course meets teaching requirements for Ph.D. program in Physiology. (S/U grading only.)—I, II, III. (I, II, III.)

390. The Teaching of Physiology (1)
Discussion—1 hour. Prerequisite: Teaching Assistant assignment to a physiology lecture course and consent of instructor. Practical experience in methods and problems of teaching physiology lecture courses. May include analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion sessions, and formulation of topics and questions for examinations under supervision of instructor. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Music

(College of Letters and Science)

Christopher A. Reynolds, Ph.D., Chairperson of the Department

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Ross Bauer, Ph.D., Professor
Anna Maria Busse Berger, Ph.D., Professor
D. Kern Holoman, Ph.D., Professor
Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement
Beth Levy, Ph.D., Assistant Professor
David A. Nutter, Ph.D., Professor
Pablo Ortiz, D.M.A., Professor
Mika Pelo, Ph.D., Assistant Professor
Christopher A. Reynolds, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Kurt Rohde, M.M., Associate Professor
Laurie San Martin, Ph.D., Assistant Professor
Henry Spiller, Ph.D., Assistant Professor
Jeffrey Thomas, Professor

Emeriti Faculty

Robert S. Bloch, M.A., Professor Emeritus
Sydney R. Charles, Ph.D., Professor Emerita
Andrew D. Frank, M.A., Professor Emeritus
Albert J. McNeil, M.S., Professor Emeritus
Jerome W. Rosen, M.A., Professor Emeritus
Wayne Slawson, Ph.D., Professor Emeritus

Affiliated Faculty

Phebe Craig, M.M., Lecturer
Sam Nichols, Ph.D., Lecturer
Robert Sabino, Lecturer
Thomas Slabaugh, M.M., Lecturer
Amelia Triest, B.A., Lecturer

Faculty Affiliates in Applied Music

Keith Bohm, D.M.A., Lecturer (saxophone)
Lois Brandwynne, M.A., Lecturer (piano)
Tod Brody, B.A., Lecturer (flute)
Delbert Bump, M.A., Lecturer (jazz)
Scott Choate, Lecturer (tuba)
Bruce Chrisp, M.M., Lecturer (trombone)
Susan Lamb Cook, M.A., Lecturer (cello)
Phebe Craig, M.M., Lecturer (harpsichord)
Kale Cumings, M.M., Lecturer (trumpet)
Thomas Derthick, B.M., Lecturer (double bass)
Daniel Flanagan, M.M., Lecturer (violin)
Jolán Friedhoff, M.M., Lecturer (violin)
Christopher Froh, M.M., Lecturer (percussion)
Michael Goldberg, M.A., Lecturer (guitar)
David Granger, M.M., Lecturer (bassoon)
Ann Lavin, D.M.A., Lecturer (clarinet)
Agnes Lee, M.M., Lecturer (harp)
Zoila Muñoz, M.M. Lecturer (voice)
Jonathan Nadel, M.M., Lecturer (voice)
Peter Nowlen, B.M., Lecturer (French horn)
Michael Seth Orland, A.B., Lecturer (piano)
Laura Reynolds, M.M., Lecturer (oboe)
Ellen Ruth Rose, M.M., Lecturer (viola)
Rita Sahai, M.A., Lecturer (Hindustani vocal music)
Michael Sand, M.M., Lecturer (violin)
Marilyn Swan, B.M., Lecturer (piano)

The Major Program

The Bachelor of Arts degree in music provides both a broad liberal arts education and the skills necessary to explore music through its history, composition, theory, and performance. Students majoring in music may choose from three tracks in the major: *(1)* composition, *(2)* music history, theory, and ethnomusicology, or *(3)* performance. After a common core of courses in the lower division, students pursue their chosen track with specialized courses leading to an appropriate senior project.

All majors are expected to complete a substantial project (composition, research presentation, recital) in the senior year (Music 195). Music majors who intend to pursue graduate studies in music are encouraged to satisfy the requirements of one of the honors programs in music.

Study Abroad and the Music major. The department encourages students to pursue a portion of their studies abroad. In close collaboration with their undergraduate advisers, students plan a course of study abroad that complements their coursework at Davis. UC Davis Music majors have completed upper division coursework at EAP partner institutions in Australia, England, France, Germany, and Italy; Music faculty members lead a summer program in Argentina.

The Program. A fundamental grounding in music theory, music history, and performance during the first two years of study leads to more specialized study of composition, history, or performance during the last two years of undergraduate work.

Career Alternatives. Students who graduate with a B.A. in music from UC Davis have gone on to careers as composers and performers, in academia,

and in the concert, media, and computing industries. Others have continued in medicine, law and business.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter..... 27-45

Music 6A, 6B, 6C 9
plus Music 2A, 2B, 2C .....(0-6)*
and Music 16A, 16B, 16C .....(0-6)*
Music 7A, 7B, 7C 9
plus Music 17A, 17B, 17C .....(0-6)*
Music 24A, 24B, 24C 9
* May be excused by diagnostic examination at the beginning of each quarter.

Depth Subject Matter 36-37

Choose upper division courses from one of the following tracks:

Track 1: Music Composition 36
Music 124A, 124B 6
Music 121 or 122..... 4
Music 130 (one year) 3
Music 195 2
At least 6 units selected from Music 131, 140-148 6
Music 101A, 101B 8
Music 103 3
At least 4 units selected from Music 102, 107A, 107B, 108A, 108B, 113, 114, 121, 122, 198, 199..... 4

Track 2: Music History, Theory, and Ethnomusicology 37
Music 124A, 124B 6
Music 121 and/or 122 8
(Need 8 units of seminar courses chosen from above in any combination. Note: Music 121 and 122 may be repeated for credit.)
Music 130 (one year) 3
Music 195 2
At least 6 units selected from Music 131, 140-148 6
At least 12 further units selected from Music 101A, 101B, 102, 108A, 108B, 113, 114, 121, 122, 198, 199 12

Track 3: Music Performance 37
Music 124A, 124B 6
Music 121 or 122..... 4
Music 130 (one year) 3
Music 195 2
At least 16 units selected from Music 131, 140-148 16
At least 6 further units selected from Music 101A, 101B, 102, 108A, 108B, 113, 114, 121, 122, 198, 199..... 6

Total Units for the Major 63-82

Note: A maximum of 19 units in performance courses (Music 130-131, 140-149) apply toward the degree; see Unit Credit Guidelines, College of Letters and Science degree requirements section.

Honors Programs. Students who wish to pursue particularly intensive studies in music should elect one of the following honors programs in place of one of the tracks above:

Theory/Composition Honors 45-49
Music 124A, 124B 6
At least 11 units selected from Music 130, 131, 140, 141, 142, 143, 144, 145, 146, 147..... 11
Music 101A, 101B 8
Two quarters of Music 194H for a total of at least 6 units resulting in a Senior composition or theory thesis 6
Select 14-18 units from Music 102, 107A, 107B, 107C, 108A, 108B, 113, 114, 122..... 14-18

Music History Honors 33-37
Music 124A, 124B 6
At least 11 units selected from Music 130, 131, 140, 141, 142, 143, 144, 145, 146, 147 11
Two quarters of Music 194H for a total of at least 6 units resulting in a Senior thesis..... 6
Select 10-14 units from Music 108A, 121, 122 10-14

Major Advisers. H.J. Spiller (A-F), D.A. Nutter (G-M), M. Pelo (N-Z)

Minor Program Requirements:

UNITS

Music..... 22

A minimum of 16 units of upper division Music courses..... 16
Courses chosen from: Music 105, 106, 107A, 107B, 110A-G, 115, 122, 126, 129A-D
A minimum of 6 units in upper division music performance courses 6
Courses chosen from: Music 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 154, 198

Foreign Language. Students contemplating graduate study in music are advised to consider pursuing foreign language study beyond the elementary level.

Diagnostic Exams are given before admission into Music 6A-6B-6C. As an alternative Music 3A-3B may be recommended. Diagnostic exams are also given for Music 16A-16B-16C and 17A-17B-17C at the beginning of each year. Transfer students should take the Music 6 diagnostic exam given during the first class meetings.

Beginning and transfer students are required to take Music 2A-2B-2C (Keyboard Competence) unless they can pass out of one or more of the classes by demonstrating proficiency through a diagnostic exam given at the beginning of each quarter. Students learn *(1)* four-part keyboard harmony in all major and minor keys; *(2)* moderate fluency with figured bass at the keyboard; *(3)* major and minor scales with proper fingering; *(4)* ability to sight read simple piano music and Bach chorales.

Beginning and transfer students are required to take Music 2A-2B-2C (Keyboard Competence) unless they can pass out of one or more of the classes by demonstrating proficiency through a diagnostic exam given at the beginning of each quarter. Students learn *(1)* four-part keyboard harmony in all major and minor keys; *(2)* moderate fluency with figured bass at the keyboard; *(3)* major and minor scales with proper fingering; ability to sight read simple piano music and Bach chorales.

Student Performing Activities. The Department of Music presents over 100 concerts each year, offering performance opportunities for both majors and non-majors in the UC Davis Symphony Orchestra, University Chorus, Concert Band and Wind Ensemble, Early Music Ensemble, Baroque Chamber Orchestra, Jazz Band, world music ensembles (Gamelan, Samba School, Hindustani Vocal Ensemble) and numerous chamber ensembles. There is a close relationship with the Robert and Margrit Mondavi Center for the Performing Arts, where several of the ensembles are resident.

Chamber ensembles perform frequently in the popular weekly Thursday Noon Concerts. Performance groups have collaborated with the Department of Theatre and Dance in productions of musical theater and opera. Study of instruments and voice with professional performers and teachers is required of all majors. Similar opportunities exist for qualified non-majors.

Faculty and Facilities. The faculty is noted for its achievements in a variety of areas. The music scholars are active in research, writing, and performance; the music of the composers is performed and recorded nationally and internationally. The journal, *19th-Century Music*, is housed in the department.

The regular faculty is joined throughout the year by visiting Artists-in-Residence, distinguished performers who give public concerts and lectures and who work with students informally.

The Empyrean Ensemble, a professional new music ensemble, is in residence at UC Davis, where it annually premieres the work of student composers. The American Bach Soloists, an ensemble of professional singers and instrumentalists specializing in music of the late 18th and early 19th centuries, is affiliated with the Department of Music.

The department's facilities include a large collection of Renaissance, Baroque, and modern instruments, along with non-western instruments including a Sundanese gamelan. The arts quadrangle houses the Computer and Electronic Music Studio, practice and rehearsal rooms, and an excellent music library with some 10,000 CDs, several hundred videos and a collection of music reference materials. Scores and music monographs are housed in the Peter J. Shields Library, adjacent to the Music Building. A partnership of campus libraries affords online access to more than 100,000 tracks of classical and world music by streaming audio.

Graduate Study. The Department of Music offers programs of study and research leading to the M.A. degree in composition/theory, musicology, ethnomusicology, and conducting, and the Ph.D. degree in composition/theory, musicology, and ethnomusicology. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

Graduate Advisers. R. Bauer, B. Levy

Courses in Music (MUS)

Lower Division Courses

2A. Keyboard Competence, Part 1 (2)
Performance—2 hours. Prerequisite: course 6A and 16A concurrently; consent of instructor. Training to meet the minimum piano requirements for the major in music. Scales and simple harmonic progressions in twelve keys, both major and minor. (P/NP grading only.)—I. (I.) Triest

2B. Keyboard Competence, Part 2 (2)
Performance—2 hours. Prerequisite: courses 6B and 16B concurrently; successful completion of course 2A or demonstration of required keyboard proficiency level on diagnostic exam; consent of instructor. Training to meet the minimum piano requirements for the major in music. Harmonic progressions, modulations and score reading at the piano. (P/NP grading only.)—II. (II.) Triest

2C. Keyboard Competence, Part 3 (2)
Performance—2 hours. Prerequisite: course 6C and 16C concurrently; successful completion of course 2B or demonstration of required keyboard proficiency level on diagnostic exam; consent of instructor. Training to meet the minimum piano requirements for the major in music. Harmonic progressions, figured bass realization, sight reading and keyboard repertory. (P/NP grading only.)—III. (III.) Triest

3A. Introduction to Music Theory, Part I (4)
Lecture—1 hour; recital—3 hours. Fundamentals of music theory, ear-training, harmony, counterpoint, and analysis directed toward the development of listening and writing techniques. Intended for the general student.—I, II. (I, II.) Triest

3B. Introduction to Music Theory, Part II (4)
Lecture—1 hour; discussion/laboratory—3 hours. Prerequisite: completion of course 3A or permission of the instructor. Development of melodic and harmonic writing skills. Basic analysis training.—II, III. (II, III.) Triest

6A. Elementary Theory, Part 1 (3)
Lecture—3 hours. Prerequisite: Admission by examination given during first class meeting; concurrent enrollment in course 16A and 2A or demonstration of required proficiency level on diagnostic exam. Development of music writing and listening skills through the study of music fundamentals, species counterpoint, harmony, analysis of repertory. Intended primarily for music majors.—I. (I.) Rohde

6B. Elementary Theory, Part 2 (3)
Lecture—3 hours. Prerequisite: course 6A; concurrent enrollment in course 16B and 2B or demonstration of required proficiency level on diagnostic exam. Continuation of course 6A.—II. (II.) Rohde

6C. Elementary Theory, Part 3 (3)
Lecture—3 hours. Prerequisite: course 6B; concurrent enrollment in course 16C and 2C or demonstration of required proficiency level on diagnostic exam. Continuation of courses 6A-B.—III. (III.) Rohde

7A. Intermediate Theory, Part 1 (3)
Lecture—3 hours. Prerequisite: course 6C; course 17B concurrently. Homophonic music of the Classical era with a focus on analysis of music by Haydn, Mozart, and Beethoven. Composition of pieces in the homophonic forms such as minuet and trio, theme and variations, rondo and sonata. Intended for music majors.—I. (I.)

7B. Intermediate Theory, Part 2 (3)
Lecture—3 hours. Prerequisite: course 7A; course 17B concurrently. Nineteenth-century harmony and voice leading through the music of the Romantic era. Focus on analysis of music by Chopin, Schumann, Brahms, Wagner, and Wolf. Composition of character pieces and songs. Intended for Music majors.—II. (II.) Nichols

7C. Intermediate Theory, Part 3 (3)
Lecture—3 hours. Prerequisite: course 7B; course 17C concurrently. The music of the first thirty years of the twentieth century and various analytical tools pertaining to it. Works of Debussy, Stravinsky, Schoenberg, Berg, and others. Composition of small pieces for solo instruments, voice and piano. Intended for Music majors.—III. (III.) Nichols

10. Introduction to Musical Literature (4)
Lecture—3 hours; listening section—1 hour. An introduction to composers and major styles of Western music. Lectures, listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.—I, II, III. (I, II, III.) Holoman, Levy, Nutter

11. Musics of the World (4)
Lecture—3 hours; listening section—1 hour. Survey of selected art, folk, and popular music cultures from different parts of the world. Emphasis on understanding relationship of musical style, aesthetic principles, and performance practice to wider cultural contexts. GE credit: ArtHum, Div.—I, III. (I, III.) Spiller

16A. Elementary Musicianship, Part 1 (2)
Lecture/laboratory—2 hours. Prerequisite: concurrent enrollment in course 6A is required; students must pass a short diagnostic exam, at the beginning of the quarter, in order to be admitted into the course. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis.—I. (I.) Triest

16B. Elementary Musicianship, Part 2 (2)
Lecture/laboratory—2 hours. Prerequisite: concurrent enrollment in course 6B is required; course 16A or demonstration of required proficiency level on diagnostic exam. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis.—II. (II.) Triest

16C. Elementary Musicianship, Part 3 (2)
Lecture/laboratory—2 hours. Prerequisite: concurrent enrollment in course 6C is required; course 16B or demonstration of required proficiency level on diagnostic exam. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis.—III. (III.) Triest

17A. Intermediate Musicianship, Part 1 (2)
Lecture/laboratory—2 hours. Prerequisite: course 7A concurrently; successful completion of course 16C or demonstrate required proficiency level on diagnostic exam. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis.—I. (I.) Craig

17B. Intermediate Musicianship, Part 2 (2)
Lecture/laboratory—2 hours. Prerequisite: course 7B concurrently; successful completion of course 17A or demonstrate required proficiency level on diagnostic exam. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis.—II. (II.) Craig

17C. Intermediate Musicianship, Part 3 (2)
Lecture/laboratory—2 hours. Prerequisite: course 7C concurrently; successful completion of course 17B or demonstrate required proficiency level on diagnostic exam. The melodic, rhythmic, and harmonic materials of Western music. Includes sight singing, explanations, drills, melodic/rhythmic/harmonic dictations, and listening analysis.—III. (III.) Craig

24A. Introduction to the History of Music I (3)
Lecture—3 hours. Prerequisite: course 6A (may be taken concurrently). History of music from the late Baroque to Beethoven. Intended primarily for majors in music. GE credit: Wrt.—II. Busse Berger

24B. Introduction to the History of Music II (3)
Lecture—3 hours. Prerequisite: course 24A, course 6B (may be taken concurrently). The history of music from the Romantic Period to the nineteenth century. Intended primarily for majors in music. GE credit: Wrt.—III. Busse Berger

24C. Introduction to the History of Music III (3)
Lecture—3 hours. Prerequisite: course 24B, course 6C (may be taken concurrently). The history of music of the 20th century. Intended primarily for majors in music. GE credit: Wrt.—I. Reynolds

28. Introduction to African American Music (4)
Lecture/discussion—3 hours; discussion—1 hour; listening; project. Survey of African American music, such as spirituals, blues, ragtime, jazz, theater, gospel, R&B, rap, and art music. Emphasis on historical and sociocultural contexts, as well as African roots. Not offered every year. GE credit: Div, Wrt.—III. Graham

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

101A. Advanced Theory, Part 1 (4)
Lecture—3 hours; lecture/laboratory—1 hour. Prerequisite: course 7C. Twentieth-century music from 1930 through 1950 and the various analytical tools pertaining to it. Works of Copland, Sessions, Schoenberg, Bartók, and Stravinsky. Composition of small pieces for piano and voice.—I. (I.) San Martin

101B. Advanced Theory, Part 2 (4)
Lecture—3 hours; lecture/laboratory—1 hour. Prerequisite: course 101A. Music from 1950 to the present and the analytical tools pertaining to it. Works of Babbit, Carter, Dallapiccola, Ligeti, Messiaen, Reich and others. Composition of small pieces for ensemble.—II. (II.) San Martin

102. Tonal Counterpoint (4)
Lecture—3 hours; practice—1 hour. Prerequisite: course 7C. Imitative tonal counterpoint with an analytical focus on the Two-Part Inventions and fugues from the The Well-Tempered Klavier by J. S. Bach. Composition of exercises and short pieces using contrapuntal techniques. Intended for music majors.—I. (III.) Bauer

103. Workshop in Composition (3)
Workshop—3 hours. Prerequisite: course 7C. Workshop in musical composition for undergraduates who are interested in pursuing serious compositional studies and intending to follow the composition track of the major. Course will explore the techniques and materials of musical composition. May be repeated for credit.—I, II, III. (I, II, III.) Ortiz, Rohde, San Martin

105. History and Analysis of Jazz (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10, 3A-3B, or 2. Jazz and the evolution of jazz styles in historical and cultural context. For non-majors. GE credit: ArtHum, Div, Wrt.—I. Bauer

106. History of Rock Music (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3A-3B, 10. Rock and the evolution of rock styles in historical and cultural context. For non-majors. GE credit: ArtHum, Wrt.—Reynolds

107A. Computer and Electronic Music (3)
Lecture—3 hours; laboratory—1 hour. Prerequisite: consent of instructor. Studies in electronic and computer music composition. The principles and procedures of composition in various electronic media are explored through compositional exercises. Limited enrollment.—I. (I.) Nichols

107B. Computer and Electronic Music (3)
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 107A and consent of instructor. Continuation of course 107A. Limited enrollment.—(II.) Nichols

108A-108B. Orchestration (2-2)
Lecture—2 hours. Prerequisite: 108A—course 7C; 108B—course 108A. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations.—II-III. (II-III.) Ortiz

110A. The Music of a Major Composer: Beethoven (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Beethoven will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.—I. Reynolds

110B. The Music of a Major Composer: Stravinsky (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Stravinsky will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.—(II.) Bauer

110C. The Music of a Major Composer: Bach (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Bach will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.—II. San Martin

110D. The Music of a Major Composer: Mozart (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Mozart will be studied in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.—(I.) Busse Berger

110E. The Music of a Major Composer: Haydn (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. The work of Haydn in the context of his time and his contemporaries. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.

110F. American Masters (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. An overview of American concert music by master composers from Charles Ives to the present. Lectures, discussion/guided listening sections, and selected readings. For non-majors. GE credit: ArtHum, Wrt.—(III.) Levy

110G. Music of a Major Composer—Handel (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. Work of Handel in the context of his time and his contemporaries. Lectures, discus-

sion/guided listening sections, and selected readings. For non-majors. Offered in alternate years. GE credit: ArtHum, Wrt.—III. Thomas

113. Introduction to Conducting (2)
Lecture—1 hour; performance—1 hour. Prerequisite: consent of instructor; course 7C. Principles and techniques of conducting as they apply to both choral and instrumental ensembles. Not offered every year.—I, II. Derthick, Slabaugh

114. Intermediate Conducting (2)
Lecture—1 hour; performance—1 hour. Prerequisite: course 113. Intermediate conducting with a continued focus on principles and techniques as they apply to both choral and instrumental ensembles.—II.

115. History of Film Music (4)
Lecture—3 hours; film viewing—3 hours. Prerequisite: courses 3A and 3B, or course 10. Film music from silent films to movies of the past decade. How music supports and shapes film narrative and structure. Use of jazz, rock and classical music in film. Offered in alternate years. Offered irregularly. GE credit: ArtHum, Wrt.—II. Ortiz

121. Topics in Music Scholarship (4)
Seminar—4 hours. Prerequisite: courses 7C and 24C, or consent of instructor. Sources and problems of a historical period or musical style selected by the instructor and announced in advance. May be repeated for credit.—I, II, III. (I, II, III.)

122. Topics in Analysis and Theory (4)
Seminar—4 hours. Prerequisite: course 7C and course 24C, or consent of instructor. Analysis of works of a composer or musical style selected by the instructor and announced in advance. Consideration of theoretical issues. May be repeated for credit.—I, II, III. (I, II, III.)

124A. History of Western Music: Middle Ages to 1600 (3)
Lecture—3 hours. Prerequisite: course 6C and 24C. Historical survey of composers and musical styles from the Middle Ages to the beginning of the 17th century. GE credit: Wrt.—II. Nutter

124B. History of Western Music: 1600-1750 (3)
Lecture—3 hours. Prerequisite: course 124A. Historical survey of composers and musical styles from the late 1500s to the mid-18th century. GE credit: Wrt.—III. Nutter

126. American Music (4)
Lecture—3 hours; listening—1 hour. Prerequisite: course 10 or 3A-3B or consent of instructor. Introductory survey of American musics, including Native American music, Hispanic polyphony, New England psalmody, and selected 20th-century composers and styles. Offered in alternate years. GE credit: Div, Wrt.—(II.) Levy

127. Music from Latin America (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Examination of music from Latin America. Characteristic music (i.e. tango, bossa nova, salsa, musica motena, musica andina) as well as its implications in other musical genres. Taught in Spanish. Not open to students who have taken Spanish 171 or 171S. (Same course as Spanish 171) Offered in alternate years.—II. Ortiz

129A. Musics of the Americas (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11 or 3A-3B. Survey of music cultures from North, Central, and South America, including the Caribbean, with emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. Not offered every year. GE credit: ArtHum, Div, Wrt.—II. Spiller

129B. Musics of Africa, Middle East, Indian Subcontinent (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11 or 3A-3B. Survey of music cultures with special emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. Offered irregularly. GE credit: ArtHum, Div, Wrt.

129C. Musics of East and Southeast Asia (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11 or 3A-3B. Survey of music cultures from Japan, China, Korea, Vietnam, and Indonesia, with special emphasis on the role of music in society and on the elements of music (instruments, theory, genres and form, etc.). Introduction to ethnomusicological theory, methods, approaches. Offered irregularly. GE credit: ArtHum, Div, Wrt.—Spiller

129D. Folk Musics of Europe (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11 or 3A-3B. Survey of folk musics from all of Europe, with emphasis on the role of music in society and on the elements of music (instruments, genres, form, etc.). Introduction to ethnomusicological theory, methods, approaches. Offered irregularly. GE credit: ArtHum, Div, Wrt.—Graham

130A-R, U. Applied Study of Music: Advanced (1)
Performance instruction—1 hour. Prerequisite: open to Music majors with ability to perform scales and short compositions from standard repertoire; admission by audition and consent of instructor. Class instruction, arranged by section: (A) Voice (prerequisite of course 1 or the equivalent); (B) Piano; (C) Harpsichord; (D) Organ; (E) Violin; (F) Viola; (G) Cello; (H) Double Bass; (I) Flute; (J) Oboe; (K) Clarinet; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tuba; (Q) Percussion; (R) Classical Guitar; (U) Recorder. May be repeated for credit. Offered as demand indicates.—I, II, III. (I, II, III.)

131A-R. Applied Study of Music: Advanced (Individual) (2)
Performance instruction—0.5 hour; independent practice—5 hours. Prerequisite: open to Music majors only; admission by audition and consent of instructor. Individual instruction in (A) Voice (prerequisite of course 1 or the equivalent); (B) Piano; (C) Harpsichord; (D) Organ; (E) Violin; (F) Viola; (G) Cello; (H) Double Bass; (I) Flute; (J) Oboe; (K) Clarinet; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tuba; (Q) Percussion; (R) Classical Guitar. May be repeated for credit.—I, II, III. (I, II, III.)

132. Singing for Actors (1)
Performance—1 hour. Prerequisite: consent of instructor. The elements of basic singing techniques, through selected exercises, vocalises, and songs. May be repeated for credit. (P/NP grading only.)

140. University Jazz Band (2)
Rehearsal—4 hours. Prerequisite: consent of instructor. Open to students in any major. Rehearsal, study, and performance of jazz band music and full variety of jazz band styles, including swing, be-bop, and contemporary jazz styles. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.) Bump

141. University Symphony (2)
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Sight-reading, rehearsal and performance of music from the orchestral literature. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.) Baldini

142. University Chamber Singers (2)
Rehearsal—3 hours, plus sectionals—at least 1 hour. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of works for small choral group. May be repeated for credit. (P/NP grading only.)—(I, II, III.) Thomas

143. University Concert Band (2)
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Rehearsal and performance of music for band. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

144. University Chorus (2)
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University. Rehearsal and performance of choral music. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.) Thomas

145. Early Music Ensemble (2)
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of Medieval, Renaissance, and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.) Nutter

146. Chamber Music Ensemble (1)
Rehearsal—2 hours; student practice—1 hour. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University whose proficiency meets the requirements of concert performance. Study, rehearsal, and performance of ensemble music for strings, winds, voice, piano, harpsichord, and organ. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.) Granger

147. University Wind Ensemble (2)
Rehearsal—4 hours. Prerequisite: consent of instructor. Open to students in any major. Rehearsal, study, and performance of a full variety of wind ensemble music; and to have students share their work in public performances. May be repeated for credit. (P/NP grading only.)—(I.) Nowlen

148. Hindustani Vocal Ensemble (2)
Rehearsal—2 hours. Basics of Hindustani music through theory and practice. Fundamentals of raga (mode) and tala (rhythms) with special emphasis on improvisation, a central feature of khyal (singing style). Five ragas each quarter. May be repeated up to six times for credit. (P/NP grading only.)—I, II, III. (I, II, III.) Sahai

149. Indonesian Gamelan Ensemble (2)
Rehearsal—2 hours. Prerequisite: consent of instructor. Indonesian music practice. Basic instrumental technique and repertory. Focus on two styles of Sundanese gamelan (tuned percussion orchestras): salendro and degung. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.) Spiller

154. University Gospel Choir (2)
Rehearsal—4 hours. Prerequisite: consent of instructor; open to any student in the university. Rehearsal, study, and performance of Gospel music. May be repeated for credit. (Same course as African American and African Studies 154.) (P/NP grading only.)—I, II, III. (I, II, III.) Lymos

192. Internship in Music (1-4)
Internship—3-12 hours. Prerequisite: consent of instructor and academic advisor or department chairperson. For Music majors. Internship outside the university related to music. Student must submit a written proposal to an appropriate Music Department instructor. May be repeated up to eight units of credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

194HA-194HB. Special Study for Honors Students (2-4)
Independent study—6-12 hours. Prerequisite: course 7C, 124B. Open only to students who qualify for the honors program and admission to Music Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of music. (Deferred grading only, pending completion of sequence.)—I, II, III. (I, II, III.)

195. Senior Project (2)
Project—6 hours. Prerequisite: Consent of instructor and undergraduate advisor. Preparation of a senior project in music composition (public presentation of a new work), in music performance (a public recital), or in music history and theory (public presentation of research results). Restricted to music majors with senior standing.—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

202. Notation (4)
Seminar—3 hours; term paper. Study of musical notation; investigation of techniques for editing Medieval and Renaissance music.—I. Busse Berger

203. Music Composition (4)
Seminar—3 hours; term paper. Technical projects that explore compositional problems, the skill and techniques with which to solve them, and free composition. May be repeated for credit.—I, II, III. (I, II, III.) Bauer, Ortiz, Rohde, San Martin

204. Advanced Conducting (3)
Tutorial—2 hours; practice. Prerequisite: courses 113 and 114 or equivalent; keyboard skills appropriate to graduate standing. Open to graduate students in conducting. This course covers the technical aspects of conducting and the broader issues in music history and analysis that conductors must face before leading a rehearsal or performance. May be repeated for credit.—I, II, III. (I, II, III.) Holoman

207. Advanced Electronic and Computer Music (4)
Seminar—2 hours. Prerequisite: courses 107A-107B-107C. Advanced composition of computer and electronic music. I. (I.)

210A. Proseminar in Music (Theory and Analysis) (4)
Seminar—3 hours; term paper. Voice-leading analysis of tonal music derived from Schenker and pitch-class set theory. Recent work on compositional design, generalizations of the concept of interval, psychologically oriented music theory, and theories of durational structure and timbre.—I. Bauer

210B. Proseminar in Music (Musicology and Criticism) (4)
Seminar—3 hours; term paper. Issues and concepts of music history, including performance practice questions for specific repertoires and periods; principles, aims, and methods of archival study; historical theory; evolution of musical styles; philosophical debates about goals and aims of the discipline in general.—III. Levy

210C. Proseminar in Music (Ethnomusicology) (4)
Seminar—3 hours; term paper. Intensive examination of major trends in ethnomusicology as exemplified by scholars working in several non-Western cultures. Ethnomusicological theory, ranging from ethnographic description to metamusicological study (Seegar) to analysis of individual genres to sociological study.—I. Spiller

212. Ethics of Musical Ethnography (4)
Seminar—3 hours; fieldwork. Prerequisite: course 210C. The role, methodology, perception, and assumptions of the ethnomusicologist in ethnographic scholarship. Examination of complex ethical and political questions in relation to practical fieldwork techniques. Offered in alternate years.

213. Transcription and Notation (4)
Seminar—3 hours; project. Prerequisite: course 210C. Practical instruction in the transcription and analysis of primarily non-Western musics. Analytical and theoretical issues, the politics of representation, and the cultural values and ideologies implicit in notation. Offered in alternate years.

221. Topics in Music History (4)
Seminar—3 hours. Studies in selected areas of music history and theory. May be repeated for credit.—I, II, III. Levy, Reynolds

222. Techniques of Analysis (4)
Seminar—3 hours. Analysis and analytical techniques as applied to music of all historical style periods. May be repeated for credit.—III. Ortiz

223. Ethnomusicology (Pacific Cultures) (4)
Seminar—3 hours; term paper. Court music, religious music, and popular forms of China, Japan, Korea, Melanesia, and Indochina. Issues concerning history, theoretical constructs, performance practice, and cultural settings of the music will be stressed. May be repeated for credit. Not offered every year.—III. Graham

299. Individual Study (1-12)
(S/U grading only.)

Native American Studies

(College of Letters and Science)

_____, Chairperson of the Department

Department Office. 2401 Hart Hall
(530) 752-3237;
http://nas.ucdavis.edu

Faculty

Julia Coates, Ph.D., Assistant Professor
Steven J. Crum, Ph.D., Professor
Inés Hernandez-Avila, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Martha J. Macri, Ph.D., Professor
Zoila Mendoza, Ph.D., Professor
Elisabeth Rose Middleton, Ph.D., Assistant Professor
Victor D. Montejo, Ph.D., Professor
Hulleah Tsinhnahjinne, M.F.A., Associate Professor
Stefano Varese, Ph.D., Professor

Emeriti Faculty

Jack D. Forbes, Ph.D., Professor Emeritus
George C. Longfish, M.F.A, Professor Emeritus

The Major Program

Native American Studies provides a multi-disciplinary introduction to the indigenous cultures of North, Central, and South America. It challenges students to consider issues of cultural diversity, sovereignty, and indigenous knowledge systems in preparation for living in a world of constantly increasing social and cultural complexity.

The Program. Students electing a major in Native American Studies may complete Plan I, Plan II, or Plan III. Plan I enables students to concentrate chiefly upon the Native experience in North America (north of Mexico). Plan II encourages interested students to focus upon Meso-America with some course work integrating Meso-America with North America and South America. Plan III focuses upon South America with some course work integrating that region with areas to the north.

Career Alternatives. Native American Studies is excellent preparation for a scholarly career or professional career such as teaching, law, human services, health, tribal administration, social work, and inter-ethnic relations. Graduate schools and agencies in these and related areas are looking for students with broad interdisciplinary preparation and who possess knowledge and sensitivity relating to ethnic issues and cultural diversity.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 20
- Native American Studies 1, 10..... 8
- One or two courses from Native American Studies 32, 33, 46, 55..... 4-8
- One or two courses from African American and African Studies 12, 52, Anthropology 2, 3, Asian American Studies 1, Chicana/o Studies 10, History 17A 4-8

Depth Subject Matter 16
- Native American Studies 130A, 157, 180..... 12
- One course from Native American Studies 107, 115, 130B, 130C, 133, 156 4

Note: If a course is counted for either Plans I, II, or III (below), it cannot also be counted as part of the 16 units of Depth Subject Matter.

Areas of Specialization (complete one plan)

Plan I—North American Emphasis 28
- Two courses from Native American Studies 107, 115, 116, 117, 118, 122, 130C, 156 8
- Two courses from Native American Studies 101, 181A, 181B, 181C..... 8
- Two courses from Anthropology 113, 136, 161A, 161B, 165, 166, 172, 173, 174, 175, 176, African American and African Studies 100, 101, 107, 120, 123, 133, 153, 160, American Studies 120, Asian American Studies 100, 101, 110, 111, 112, Chicana/o Studies 100, 110, 111, 154, 156, Sociology 128, Women's Studies 102 8
- One other upper division Native American Studies course, selected in consultation with adviser 4

Plan II—Mexico-Central America Emphasis 28
- Native American Studies 107, 133 8
- Three courses from History 161A, 166A, 166B, Anthropology 134, 145, 146, 174, 175, Chicana/o Studies 130, Native American Studies 122..... 12
- Two courses from Spanish 155, 172, Art History 151, Native American Studies 101, 156, 181A, 181B, 181C, or, if student's work is specifically focused upon a Meso-American language or topic, from Native American Studies 188, 191..... 8

Plan III—South American Emphasis 28
- Native American Studies 107, 120 8
- Two courses from History 161A, 161B, 162, 163A, 163B, 165 8
- Three courses from Anthropology 134, 144, 174, 175, Native American Studies 101, 122, 156, 181A, 181B, 181C, or, if student's work is specifically focused upon a South American language or topic, from Native American Studies 188, 191 12

Total Units for the Major 64

Major Adviser. S. Crum

Minor Program Requirements:

The Native American Studies minor provides an introduction to the Native experience in the Americas by means of exposure to course work dealing with some of the major aspects of Indian life, including history, values, politics, literature, and art.

UNITS

Native American Studies..... 24
- Native American Studies 1 or 10..... 4
- Five upper division courses, at least one of which is chosen from each of the following groups..... 20
  - *Ethno-History:* Native American Studies 130A, 130B, 130C, or 133
  - *Philosophy and values:* Native American Studies 156, 157, or 180
  - *Politics and current affairs:* Native American Studies 115, 116, 117, 118, 120, 122
  - *Art and literature:* Native American Studies 101, 181A, 181B, or 181C
  - One other upper division course selected in consultation with adviser.

Study Off Campus. Majors have the option of spending one to three quarters elsewhere in the Americas or on or near a reservation as part of the fulfillment of the Area of Specialization. Each student's plan must be approved by the student's adviser and by the chairperson and may fulfill from 12 to 20 of the 28 units required for the emphasis. The courses or field internship taken elsewhere must be focused upon indigenous peoples or indigenous languages and the institution of study shall be located in an area with substantial indigenous population. Students must have upper division standing and, for Plan I, course 107 or the equivalent should have been completed; for Plan II, courses 107 and 133 should have been completed; and for Plan III,

courses 107 and 120 should have been completed prior to departure. Several options may be used for receiving academic credit, including course 195. The department strongly encourages students to participate in the UC Education Abroad Program, Short-Term Programs Abroad.

Graduate Study. The Department offers a program of study leading to the M.A. and Ph.D. degrees in Native American Studies, as well as a designated emphasis in Native American Studies for graduate students in approved programs. Further information regarding graduate study may be obtained at the Department office and at Graduate Studies.

Graduate Advisers. Martha J. Macri

Courses in Native American Studies (NAS)

Lower Division Courses

1. Introduction to Native American Studies (4)
Lecture—3 hours; discussion—1 hour. Introduction to Native American Studies with emphasis upon basic concepts relating to Native American historical and political development. GE credit: SocSci, Div.—I, II, III. (I, II, III.) Crum, Coates, Middleton, Montejo

5. Introduction to Native American Literature (4)
Lecture/discussion—4 hours. Prerequisite: completion of Subject A requirement. Study of selected Native American texts. Intensive focus on analysis of these texts, with frequent writing assignments to develop critical thinking and composition skills. GE credit: ArtHum, Div, Wrt (cannot be used to satisfy a college or university composition requirement and GE writing experience simultaneously).—I, II, III. (I, II, III.)

10. Native American Experience (4)
Lecture—3 hours; discussion—1 hour. Introduction to the diverse cultures of Native American peoples from North, Central, and South America. Emphasis on Native American voices in the expression of cultural views and in the experience of conflicting values. GE credit: ArtHum or SocSci, Div, Wrt.—I, II, III. (I, II, III.) Hernández-Avila, Mendoza, Macri, Tsinhnahjinnie, Varese

32. Native American Music and Dance (4)
Lecture/discussion—4 hours. Introduction to the music and dance of the native peoples of the Americas. Students will study secular native music and dance from a cross-section of regions and tribes. GE credit: Div.—(I.) Mendoza

33. Native American Art in the U.S. (4)
Lecture—4 hours. Comprehensive survey of Indian art forms with emphasis upon design, media, and function. Intent is to familiarize the student with a wide range of styles and techniques. GE credit: ArtHum, Div.

34. Native American Art Workshop (4)
Lecture—1 hour; laboratory—6 hours; 3 hours to be arranged. Prerequisite: consent of instructor; course 33 recommended. Studio projects in Native American art, design, and crafts. (P/NP grading only.)—I. Tsinhnahjinnie

46. Orientation to Research in Native American Studies (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Native American Studies major or minor, or consent of instructor. Introduces students to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Emphasis is upon learning to use documentary resources or other collections of data. Students will carry out individual projects. Limited enrollment. GE credit: SocSci, Div, Wrt.

55. Americanisms: Native American Contributions to World Civilization (4)
Lecture/discussion—4 hours. Prerequisite: course 1 or 10 recommended. American indigenous people's contributions to the contemporary world, with attention to forced participation of Indian societies in the development of Western dominance and resulting appropriation of cultural creations. Responses and initiatives of indigenous peoples will be analyzed. GE credit: SocSci, Div, Wrt.

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Contemporary Indian Art (4)
Lecture—4 hours. Prerequisite: course 33. Historical review of contemporary Indian art from 1900 to the present by looking at the two art centers of Oklahoma and Santa Fe. Social pressures that have influenced the imagery that exists today will be examined. GE credit: ArtHum, Div.—III. Tsinhnahjinnie

107. Special Topics in Native American Languages (4)
Lecture/discussion—4 hours. Prerequisite: consent of instructor. Investigation of various subjects in contemporary and historical Native American language studies. May be repeated for credit when a different topic is studied. GE credit: Div.—II. (I.) Macri, Mendoza

108. Indigenous Languages of California (4)
Lecture/discussion—4 hours. Survey of the indigenous languages of the California region: linguistic prehistory, languages at first European contact, subsequent language loss, current efforts at language and cultural revitalization, indigenous languages of recent immigrants to California. GE credit: Div, Wrt.—II. (III.) Macri

110A. Quechua Language and Society, Beginning Level 1 (4)
Lecture/discussion—4 hours. Introduction to Quechua language and society emphasizing the practical use of the language. Provides the student with some basic Quechua communication skills and with an initial knowledge about contemporary Andean society and the status of Quechua language today. Not available for students who took course 107-02 in the fall quarter of 2007.—I. (I.) Mendoza

110B. Quechua Language and Society, Beginning Level 2 (4)
Lecture/discussion—4 hours. Prerequisite: course 110A. Second Level of the teaching of Quechua language and society. Emphasis on development of conversational and reading skills. Continuation of the study of aspects of contemporary Andean society and the status of Quechua language today.—II. (II.) Mendoza

110C. Quechua Language and Society, Intermediate Level 1 (4)
Lecture/discussion—4 hours. Prerequisite: courses 110A and B. Third level of the teaching of Quechua language and society. Emphasis on development of conversational and reading skills. Introduction to more complex grammatical structures. Continuing the study of contemporary Andean society and the status of Quechua language today. Offered in alternate years.—II, III. (II, III.) Mendoza

110D. Quechua Language and Society, Intermediate Level 2 (4)
Lecture/discussion—4 hours. Prerequisite: courses 110 A, B and C. Fourth level of the teaching of Quechua language and society. Emphasis on complex structural patterns while emphasizing conversational skills and improving reading competence. Study of different sociopolitical processes that have affected Andean identity and the status of Quechua language. Offered in alternate years.—II, III. (II, III.) Mendoza

115. Native Americans in the Contemporary World (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 10, or 55. The sociocultural development of American Indian populations in modern times with emphasis upon North America. Attention will be given to contemporary Indian affairs and problems as well as to the background for present day conditions. Not open for credit to students who have completed Anthropology 141B. (Former course Anthropology 141B.) GE credit: SocSci, Div, Wrt.—I. (II.) Montejo

116. Native American Traditional Governments (4)
Lecture—4 hours. Prerequisite: course 1; Anthropology 2. Study of selected Native American Tribal Governments, confederations, leagues, and alliance systems. Offered in alternate years. GE credit: SocSci, Div.

117. Native American Governmental Decision Making (4)
Lecture—4 hours. Prerequisite: course 116, Political Science 2; Anthropology 123 recommended. Native American governmental and community decision making with emphasis on federal and state programs, tribal sovereignty, current political trends and funding for tribal services. Offered in alternate years. GE credit: SocSci, Div.—II.

118. Native American Politics (4)
Lecture—4 hours. Prerequisite: course 117. Examination of the various interest groups and movements found among Native people and how they relate to the determination of Indian affairs. Study of political action available to Native groups, and local communities, along with relevant theory relating to underdevelopment. Offered in alternate years. GE credit: SocSci, Div.—III.

120. Ethnopolitics of South American Indians (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 10 or 55. Social, political, cultural movements of indigenous South Americans in response to establishment, expansion of European colonialism, post-colonial nation-states. Ethnopolitical processes developed through interactions between Indians, Euroamericans. Socioethnographic analysis of main indigenous areas and the development of national societies. GE credit: SocSci, Div, Wrt.—(I.) Varese

122. Native American Community Development (4)
Lecture—4 hours. Prerequisite: course 1, Community and Regional Development 151. Application of community development theory and techniques to the development problems of Native American communities. Offered in alternate years. (Former course 161.) GE credit: SocSci, Div, Wrt.—II. Varese

125. Performance and Culture Among Native Americans (4)
Lecture—3 hours; listening—3 hours. Prerequisite: upper division standing in division of humanities or social sciences or consent of instructor. Interdisciplinary study of public expressive forms among Native Americans. Comparative analysis of music, dances, rituals, and dramas from throughout the Americas in their social and cultural contexts. Offered in alternate years. Not open for credit to students who have completed Music 125.—(III.) Mendoza

130A. Native American Ethno-Historical Development (4)
Lecture—4 hours. Prerequisite: course 1 or 10; History 17A recommended. Study of Native American ethno-history in North America before 1770s. GE credit: SocSci, Div, Wrt.—I. (I.) Crum

130B. Native American Ethno-Historical Development (4)
Lecture—4 hours. Prerequisite: course 1; History 17A-17B recommended. Study of Native American ethno-history in North America, 1770-1890. GE credit: SocSci, Div, Wrt.—II. (II.) Crum

130C. Native American Ethno-Historical Development (4)
Lecture—4 hours. Prerequisite: course 1; History 17A-17B recommended. Study of Native American ethno-history in North America after 1890. GE credit: SocSci, Div, Wrt.—III. Crum

133. Ethnohistory of Native People of Mexico and Central America (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 10 or 55. Ethnohistorical development of pre-colonial, colonial, post-colonial Mexican and Central American indigenous people; the impact of eco-

nomic and political factors on the process of cultural adaptation. Attention is given to the questions of nation-building, forced assimilation, indigenous resistance, organized political responses. GE credit: SocSci, Div.—III. (III.) Varese

133A. Ethnoshistory of Native Peoples of Mexico and Central America to 1500 (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or course 10 or consent of instructor. Ethnohistorical development of the indigenous peoples of Mexico and Central America up to and including the earliest period of European contact. Focus is on indigenous written historical records of the Maya, Mixtec, and Nahuatl peoples. May be repeated one time for credit. GE credit: Div, SocSci, Wrt.—I, II, III. (I, II, III.) Macri

133B. Ethnohistory of Native Peoples of Mexico and Central America 1500 to 2000 (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or course 10, or consent of instructor. Ethnohistory of indigenous peoples of Mexico and Central America from 1500 to contemporary times. Focus on social and cultural dynamics of indigenous peoples. May be repeated one time for credit. GE credit: Div, SocSci, Wrt.—I, II, III, IV. (I, II, III, IV.) Varese

134. Race and Sex: Race Mixture and Mixed Peoples (4)
Lecture—4 hours. Prerequisite: one course chosen from Anthropology 1 or 2, Native American Studies 10, Chicana/o Studies 110, African American and African Studies 100 or Asian American Studies 110. The phenomena of racial, ethnic and interreligious intermixture and marriage, and of multi-ethnic peoples. Emphases on the Americas and upon the sociocultural effects of intermixture and on the lives of bicultural and multi-ethnic persons. (Same course as Anthropology 134.) GE credit: SocSci, Div, Wrt.—II. Coates

156. Native American Ethics and Value Systems (4)
Lecture—4 hours. Prerequisite: upper division standing; course 1. Analysis of Native American systems of values and how these values translate into actual behavior; attention to the problem of implementing traditional values in the twentieth century and the possible impact of native values in modern societies. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

157. Native American Religion and Philosophy (4)
Lecture—4 hours. Prerequisite: upper division standing; course 1 or Anthropology 2. Religious and philosophical thinking of Native American people with emphasis upon North America. Offered in alternate years. GE credit: Div.—(II.) Hernández-Ávila

180. Native American Women (4)
Lecture/discussion—4 hours. Prerequisite: course 1 or 10 or Women's Studies 50. Social and cultural foundations of the Native American women's personality, including the development of the Indian girl and the life phases of mature womanhood. Autobiographical and biographical texts are utilized. GE credit: SocSci, Div, Wrt.—II. (II.) Coates

181A-181B-181C. Native American Literature (4-4-4)
Lecture—4 hours. Prerequisite: English 3, Comparative Literature 1, 2, 3, or any course from the General Education Literature Preparation List. Analysis of works by or about Native Americans including novels and autobiographies, analysis of Native American poetry, oral literature, songs, and tales. (A), the novel and fiction; (B), nonfiction works by native authors; (C), traditional literature and poetry. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—I, II. (I-II-III.) Hernández-Avila, Montejo

184. Contemporary Indigenous Literature of Mexico (4)
Lecture—4 hours. Prerequisite: course 1 or 10; course 181A or 181C recommended. Reading knowledge of Spanish required. Contemporary indigenous literature of Mexico, with a focus on the genres (poetry, fiction, drama, essay); analysis of cultural, historical, and spiritual themes, imagery, styles and performances; biographies of and influences on the Native writers themselves. Offered in alternate years.—(III.) Hernández-Avila

188. Special Topics in Native American Literary Studies (4)
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Special topics drawn from Native American literature. May be repeated for credit when a different topic is studied. GE credit: Div, Wrt.—III. (II.) Hernández-Ávila, Montejo

190. Seminar in Native American Studies (2)
Discussion—2 hours. Prerequisite: senior standing. Seminar of critical issues faced by Native American people. (P/NP grading only.)

191. Topics in Native American Studies (4)
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Selected topics in Native American ethno-history, development, culture, and thought. May be repeated for credit when a different topic is studied. GE credit: ArtHum, Div.—III. (I.)

192. Internship (1-12)
Internship. Prerequisite: consent of instructor; upper division standing; dependent on availability of intern position in Native American Studies or the CN Gorman Museum; priority to Native American Studies minors/major. Supervised internship in the CN Gorman Museum, community, and institutional settings related to Native American concerns. May be repeated three times for a maximum of 12 units including 192 and other internships taken in other departments and institutions. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Tsinhnahjinnie

194HA-194HB. Special Studies for Honors Students (4-4)
Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research and writing culminating in the completion of a senior honors thesis or project under direction of faculty adviser. (Deferred grading only, pending completion of sequence.)

195. Field Experience in Native American Studies (12)
Field work—36 hours. Prerequisite: senior standing and major in Native American Studies, completion of lower division major requirements, and course 161. Field work with governmental and community groups, under supervision of faculty adviser and sponsor. Knowledge acquired in other courses to be applied in field work. (P/NP grading only.)—I, II, III. (I, II, III.)

196. Senior Project in Native American Studies (4)
Discussion—1 hour; independent study—3 hours. Prerequisite: senior standing and major in Native American Studies, course 195 (may be taken concurrently), and consent of instructor. Guided research project that enables student to apply the theory and research principles from major course work. Final product is to be a major senior project or thesis. (P/NP grading only.)—I, II, III. (I, II, III.)

197TC. Community Tutoring in Native American Studies (1-5)
Tutorial—3-15 hours. Prerequisite: consent of major committee; upper division standing with major in Native American Studies. Supervise tutoring in community. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200. Basic Concepts in Native American Studies (4)
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Analysis of the characteristics of the discipline of Native American Studies. Concentration is on both traditional and contemporary native scholarship and thought as well as the theoretical and methodological consequences derived from application of these ideas. Offered in alternate years.—(I.)

202. Advanced Topics in Native American Studies (4)
Seminar—4 hours. Prerequisite: graduate standing. Advanced study of selected topics or themes relevant to the field of Native American studies. Topics will be announced at the time of offering. May be repeated for credit when topic differs.—II, III. (I, II, III.)

207. Leadership Skills and Strategies in California Language Documentation & Revitalization (4)
Seminar—3 hours; term paper. Introduction to the indigenous languages of the Americas, with a focus on California; an examination of how contemporary Native communities document and revitalize their heritage languages. Learn to assist and administer language programs.—III. (III.) Macri

212. Community Development for Sovereignty and Autonomy (4)
Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Examines a sample of contemporary indigenous communities from south, central and north America with the goal of understanding and evaluating the strategies adopted by Native American communities to develop and implement forms of sovereignty or autonomous self-management. Offered in alternate years.—III. Varese

213. Public Law 83-280: Colonial Termination (4)
Seminar—4 hours. Prerequisite: graduate standing, including school of law students. Examination of the signature law of the Termination Era, Public Law 83-280. Discussions to include termination, societal conformity, political consent, jurisdiction, self-determination & decolonization, and colonial relationship between Native Peoples and the United States.—(III.) Valandra

217. Public Law 83-280: Colonial Termination (4)
Seminar—4 hours. Prerequisite: graduate standing, including school of law students. Examination of the signature law of the Termination Era, Public Law 83-280. Discussions to include termination, societal conformity, political consent, jurisdiction, self-determination & decolonization, and colonial relationship between Native Peoples and the United States.—I, II, III. (I, II, III.)

220. Colonialism/Racism and Self-Determination (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Study of imperial/colonial systems and their psychosocial impacts upon oppressors and oppressed, of racism as the outgrowth of colonialism, and of nationalism, ethnic conflict and self-determination. Focus on indigenous peoples, but other groups will also be considered. Offered in alternate years.—(II.) Varese

224. Performance in the Americas (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Ethnomusicological and anthropological approaches to study of public performance in the Americas. New ways of looking at music, dance, rituals and other forms of public expressive forms normally called "folklore" or "popular culture." Offered in alternate years. Not open for credit to students who have completed Music 224. (Former course Music 224.)—(II.) Mendoza

250. Indigenous Critique of Classic Maya Ethnographies (4)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Construction of the Maya world through ethnographic writing during the present century. Deconstruction of ethnographies about the Mayans considering the modern theories and social/anthropological critiques of modern ethnographies. Offered in alternate years.—(II.) Montejo

280. Ethnohistorical Theory and Method (4)
Seminar—3 hours; term paper. Discussion of the ethnohistorical method; the utilization of diverse types of data, especially documentary sources, to reconstruct socio-cultural history. Particular attention to the applied area of ethnohistory in the solution of contemporary social problems. Offered in alternate years.—I. Crum

298. Group Study for Graduate Students (1-5)
Prerequisite: graduate standing, consent of instructor. (S/U grading only.)

299. Special Study for Graduate Students (1-12)
Prerequisite: graduate standing, consent of instructor. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Natural Sciences

(College of Letters and Science)

Advising Center. 1023 Sciences Laboratory Building

(530) 754-9621;
http://naturalsciences.ucdavis.edu/

Committee in Charge

Howard W. Day, Ph.D., Chairperson *(Geology)*
Patricia Boeschaar, Ph.D. (*Physics)*
Jack M. Goldberg, Ph.D.,
(Neurobiology, Physiology, and Behavior)
David A. Osleger, Ph.D. *(Geology)*
J. Richard Pomeroy, Ph.D. *(Education)*
Wendell H. Potter, Ph.D. *(Physics)*
Dino S. Tinti, Ph.D. (*Chemistry)*

The Major Program

Natural Sciences is an interdisciplinary major that provides significant breadth in biology, chemistry, earth sciences, physics and mathematics while offering additional depth in two of the natural sciences. It is especially designed to meet the needs of prospective science teachers, but will also serve students who wish to acquire training in more than one science. The major is sponsored by the Department of Geology.

The Program. The Natural Sciences curriculum offers an unusually broad training in science and mathematics. All students must complete a one year sequence in calculus, a course in statistics and one year sequences in chemistry, earth science, life science and physics. Each student will complete depth courses in two of these sciences. Prospective teachers may use these depth courses as preparation for primary and supplementary teaching credentials in science. Students who might wish to prepare for a teaching credential program should consult an advisor at their first opportunity in order to combine the prerequisites with General Education requirements.

Career Alternatives. Students whose goals include business, journalism, law, or medicine may acquire a broad background in science through this curriculum. The study of natural sciences also prepares a student to meet the subject matter requirements for primary and supplementary science teaching credentials in California. Students who might wish to become a teacher should consult an advisor in the Mathematics and Science Teaching Program (MAST, http://mast.ucdavis.edu) at their first opportunity. MAST advisors can help students combine the prerequisites for a credential program with General Education requirements. The program also offers seminars that give participants experience in elementary, middle school, and high school classrooms.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter.....68
- Chemistry 2A, 2B, 2C..... 15
- Biological Sciences 2A, 2B, 2C..... 15
- Geology 2, 3, 3L, 50L, 60..... 13
- Mathematics 16A, 16B, 16C..... 9
- Physics 7A, 7B, 7C..... 12
- Statistics 100 or 102..... 4

Depth Subject Matter 42
- Concentration (chosen from among the four fields of concentration listed below)..... 27
- Supplementary Field; chosen from among the four fields listed below. May not include the same field as the concentration. The same course may not be used to fulfill the requirements for both a Concentration and a Supplementary Field..... 15

Total Units for the Major 110

Fields of Concentration:
- Chemistry 27
  - Chemistry 105, 107A, 107B, 118A, 118B, 118C, 124A..... 25
  - Chemistry 197 or 199..... 2
- Earth Science 27
  - Geology 62, 100, 100L, 105, 108, 109, 109L, 116N..... 20
  - Soil Science 100 4
  - Geology 199 3
- Life Science.....27-34
  - Chemistry 8A, 8B or 118A, 118B, 118C 6-12
  - Biological Sciences 101 4
  - Evolution and Ecology 100, 101 8
  - Neurobiology, Physiology, and Behavior 101 5
  - Neurobiology, Physiology, and Behavior 101L or Molecular and Cellular Biology 160L 3-4
  - One 199 course from Biological Sciences, Evolution and Ecology, Molecular and Cellular Biology, or Neurobiology, Physiology, and Behavior..... 1
- Physics 27
  - Chemistry 107A, 110A..... 7
  - Geology 161, 162 6
  - Physics 108, 122..... 7
  - Physics 137 or 160..... 3
  - Physics 199..... 4

Supplementary Fields:
- Chemistry 15
  - Chemistry 105, 107A, 118A, 124A... 14
  - Approved elective 1
  - Other Chemistry or related science courses may be substituted with the prior approval of the major adviser.
- Earth Science 15
  - Geology 108, 109, 109L, 116N, 138 14
  - Approved elective 1
  - Other Geology or related science courses may be substituted with the prior approval of the major adviser.
- Life Science..... 15
  - Biological Sciences 101* 4
  - Evolution and Ecology 100 4
  - Neurobiology, Physiology, and Behavior 101 5
  - Approved electives..... 2
  - Other Biological Sciences or related science courses may be substituted with the prior approval of the major adviser.
- Physics 15
  - Physics 122 3
  - Chemistry 107A, 110A.....7
  - Geology 161 3
  - Approved electives.....2
  - Other Physics or related science courses may be substituted with the prior approval of the major adviser.
  - *Note: Students pursuing a concentration in earth science or physics may not have had the necessary prerequisites in organic chemistry.

Major Advisers. H. W. Day *(Geology)*, D. A. Osleger *(Geology)*

Nature and Culture

(College of Letters and Science)

This major will be discontinued effective June 30, 2011.

Eric Smoodin, Ph.D., Program Director

Program Office. 176 Voorhies Hall
(530) 752-2257; http://www.nac.ucdavis.edu

Committee in Charge

Virginia Boucher, Ph.D. *(John Muir Institute of the Environment; Natural Reserve System)*
Laurie Glover, Ph.D. *(English)*
Louise Jackson, Ph.D. *(Land, Air and Water Resources)*
Peter Moyle, Ph.D. *(Wildlife, Fish, and Conservation Biology)*
David A. Osleger, Ph.D. *(Geology)*
Michael L. Smith, Ph.D. *(American Studies)*
Eric Smoodin, Ph.D. *(American Studies)*
Julie Sze, Ph.D. *(American Studies)*
Michael Ziser, Ph.D. *(English)*

The Major Program

Admission to the undergraduate major in Nature and Culture has been suspended and the major will be discontinued effective June 30, 2011.

The Nature and Culture major is a coherent interdisciplinary set of studies that offers exploration of the complex relationships existing between human cultures and the natural world.

The Program. This program is the first of its kind in the country, providing a rigorous curriculum that interweaves courses in the natural sciences, the humanities, and the social sciences, supplemented by elective course work in these and other fields of study. There are at present three required core courses in Nature and Culture itself, a principal function of which is to tie together knowledge and experience gained in the various disciplines that students will work in as they progress through their studies.

Career Alternatives. Students completing an A.B. degree in Nature and Culture will be qualified to enter most professional schools, such as medicine and law, and many graduate programs in science and the humanities, especially those with an emphasis on interdisciplinary study. Students expecting to apply for highly specialized fields will need to plan their elective work carefully. The degree program provides excellent preparation for careers in business and government, as well as for the credential program for K-12 teaching. When combined with courses in non-fiction writing, the Nature and Culture curriculum will prepare students for the burgeoning fields of environmental writing and environmental journalism.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter.....38-41
- Nature and Culture 1 4
- Geology 3-3L and 50-50L and Geology 36 or Astronomy 2; or Chemistry 2A-2B and Biological Sciences 2A..... 13-15
- Biological Sciences 2B-2C 10

Environmental Science and Policy 30, or Anthropology 2, or Geology 10..... 3-4
Comparative Literature 1, 2, 3, or 4, or English 3 4
Comparative Literature 20 4

Recommended. Statistics 13, 32, 102, or 103.

Depth Subject Matter 44

Nature and Culture 100 and 180 8
Nature and Culture 120 or 140, or American Studies 157, or Veterinary Medicine 170 4
Environmental Science and Policy 100, or Evolution and Ecology 101 or Plant Biology 147 4
Anthropology/Environmental Science and Policy 101 or 102 4
Nature and Culture 130, or English 184 or Native American Studies 181A, 181B, or 181C, or Comparative Literature 120 4
Electives, a minimum of 20 units selected in consultation with an adviser from one or two thematic clusters. Possible clusters include Human Evolution and Ecology, Human Culture and Society, Historical and Philosophical Studies, Indigenous Peoples, California and the Southwest, Art and Literature, Earth and Environment, The Impact of Humans on the Environment, Ecological and Environmental Studies, Environmental Law, Policy and Planning. A representative list of clusters and courses is available from advisers and from the Program office 20

Total Units for the Major 82-85

Major Advisers. Consult the Program office.

Minor Program Requirements:

UNITS

Nature and Culture 24

Nature and Culture 1 4
Nature and Culture 100 4
Environmental Science and Policy 100, or Evolution and Ecology 101, or Plant Biology 147 4
Nature and Culture 120 or 140, or Veterinary Medicine 170 4
Anthropology/Environmental Science and Policy 101 or 102 4
English 184 or Native American Studies 181A, 181B, or 181C 4

Courses in Nature and Culture (NAC)

Lower Division Courses

1. Intersections of Nature and Culture (4)
Lecture/discussion—3 hours; term paper. Prerequisite: satisfaction of Subject A requirement; Comparative Literature 1, 2 or 3, or English 3 recommended. Nature and culture as human constructs, conditioned by both time and place; importance of nature in human thought, both scientific and spiritual; scientific and literary view of the relation between nature and culture, including forms of observation and methods of analysis. GE credit: ArtHum or SciEng, Wrt.—II. (II.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Individual Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. The Culture of Nature: Theoretical Frameworks and Case Studies (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1. Problems in nature and culture, with particular attention to integrative theoretical frameworks available for the investigation of specific issues. Case studies will vary with instructor. May be repeated one time for credit when topic and instructor differ. Offered in alternate years. GE credit: ArtHum or SciEng, Wrt—III.

120. Environmental Ethics (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1. Ethical issues underlying environmental/ecological controversies, including anthropocentrism vs. ecocentrism, wilderness and species preservation, human population growth, animal rights, deep ecology, and ecofeminism. Emphasis is on critical examination of issues from cross-cultural, theoretical, and applied perspectives. GE credit: ArtHum, Wrt.—(III.) McLean

130. The Nature of Exploration (4)
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Writings and drawings of a historical period of exploration, with a focus on descriptions of nature. Consideration of what representations of the enterprise of exploration reveal about the cultural values of the explorers, and how those values persist. Offered in alternate years. GE credit: ArtHum, Wrt.—I. Glover

140. Animal Rights (4)
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing. Issues surrounding animal rights, including hunting, fishing, industrial husbandry and slaughter, experimentation, and pets. Emphasis on the complexities of human relations to other animals from historical, literary, and cross-cultural perspectives. Offered in alternate years. GE credit: ArtHum, Wrt.—II. McLean

160. Art and the Natural World (4)
Studio—6 hours. Field trips. Exploration of how the people of various cultures, from traditional to contemporary, have expressed their relationship to the natural world in art.

180. Fieldwork in Nature and Culture (4)
Discussion—1 hour; fieldwork—70 hours/quarter; term paper. Prerequisite: course 100 and consent of instructor. Fieldwork: one week prior to the beginning of the quarter, plus two weekends. Natural scientific, social scientific, and literary/artistic approaches to the study of nature and culture in one place, which will vary with instructor. Offered in alternate years.—I. (I.)

192. Internship in Nature and Culture (1-12)
Internship—3-36 hours. Prerequisite: course 1. Internship in natural sciences, social sciences, or humanities on or off campus in which students use and improve their interdisciplinary skills and perspectives gained through the Nature and Culture curriculum. Supervised by a faculty member. May be repeated for credit. (P/NP grading only.)

194H. Special Study for Honors Students (3)
Seminar—3 hours; term paper. Prerequisite: consent of instructor; admission to the Nature and Culture Honors program. Students must contact the department before enrolling. Supervised reading, research and writing to prepare for developing a project proposal under the direction of faculty sponsor. Not offered every year.—I, II.

195H. Honors Project (3)
Independent study; project. Prerequisite: consent of instructor; admission to the Nature and Culture Honors program. Students must contact the department before enrolling. Second of a two-course sequence comprising the senior honors program. It is an individual-study course in which a student produces an honors project under the supervision of a faculty member. Not offered every year.—II, III.

197T. Tutoring in Nature and Culture (1-5)
Tutoring—3-15 hours. Prerequisite: consent of instructor. Assist in field trips, lead study sessions with groups and individual students. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Individual Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Nematology

(College of Agricultural and Environmental Sciences)

Steven A. Nadler, Ph.D., Chairperson of the Department

Chair Office. 488 Hutchison Hall
(530) 752-7567; http://nematology.ucdavis.edu

Department Office. 354 Hutchison Hall
(530) 752-0300

Faculty

Edward P. Caswell-Chen, Ph.D., Professor
Howard Ferris, Ph.D., Professor
Harry K. Kaya, Ph.D., Professor *(Entomology)*
Edwin E. Lewis, Professor *(Entomology)*
Steven A. Nadler, Ph.D., Professor
Becky B. Westerdahl, Ph.D., Professor
Valerie M. Williamson, Ph.D., Professor

Emeriti Faculty

Bruce A. Jaffee, Ph.D., Professor Emeritus
Armand R. Maggenti, Ph.D., Professor Emeritus
Dewey J. Raski, Ph.D., Professor Emeritus

Minor Program Requirements:

UNITS

Nematology 18-20

Nematology 100, 110, and Soil Science 100 10
Two or three courses from one of the following areas..... 8-10
(a) Plant Science: Microbiology 102; Entomology 100, 135, 153, 156, 156L; Evolution and Ecology 112; Plant Pathology 120, 148; Plant Biology 121; Soil Science 111, 112
(b) Entomology: One upper division Entomology course; Evolution and Ecology 112; Microbiology 102; Plant Biology 121; Plant Pathology 120, 148; Soil Science 102, 111, 112

Minor Adviser. S. A. Nadler

Graduate Study. Graduate degrees specializing in Nematology are offered through the Departments of Entomology and Plant Pathology, and through various Graduate Groups (Biochemistry, Ecology, Genetics, Plant Protection and Pest Management). Refer also to the Graduate Studies chapter of this catalog.

Courses in Nematology (NEM)

Lower Division Course

10V. General Biology (4)
Web virtual lecture—3 hours; web electronic discussion—1 hour. Concepts and issues in biology. Emphasis on composition and structure of organisms; regulation and signaling; heredity, evolution and the interaction and interdependence among life forms and their environments. Significant writing is required. Designed for students not specializing in biology. Not open for credit to students who have completed course Biological Sciences 1A, 1B, 1C, 2A, 2B, 2C, or 10. (Same course as Biological Sciences 10V.) GE credit: SciEng, Wrt.—III. (III.) Westerdahl

Upper Division Courses

100. General Plant Nematology (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1B or 10. An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.—I. (I.) Ferris

110. Introduction to Nematology (2)
Lecture—2 hours. Prerequisite: Biological Sciences 1B or the equivalent or consent of instructor. The relationship of nematodes to human environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil as parasites of plants and animals.—II. (II.) Caswell-Chen, Nadler

150. Revising Scientific Prose (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one course in English composition, understanding of English grammar and parts of speech, upper division standing in a science major, or consent of instructor. Principles of detailed revision; close analysis of writing styles in research papers, popular scientific articles, and other scientific reports; use of verb-based and noun-based writing styles. GE credit: Wrt.—II. (II.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

201. Molecular and Physiological Plant Nematology (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: Biological Sciences 101; Plant Pathology 120, course 100 or 110. Molecular biology and physiology of nematodes using *Caenorhabditis elegans* as a model, but with emphasis on plant-parasitic species. Plant responses to nematodes. Discussion of current literature emphasized. Offered in alternate years.—II. Williamson

203. Ecology of Parasitic Nematodes (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: course 100 or 110 or Entomology 156; Evolution and Ecology 101 or Plant Biology 117. Major concepts in population and community ecology of animal- and plant-parasitic nematodes. Current advances in techniques, theory, and basic information about nematode-host dynamics, and application to management of nematode diseases. Offered in alternate years.—(III.) Caswell-Chen

204. Management of Plant-Parasitic Nematodes (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100 or 110. Theory, foundation, principles and practices of nematode management. Techniques and equipment used to manage nematodes and methods used to analyze their effectiveness. Offered in alternate years.—III. Westerdahl

205. Insect Nematology and Biological Control (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: courses 100 and 110, Entomology 100 or 110. The biology of insect-parasitic nematodes, their effect on the host, and their potential as biological control agents of insect and other invertebrate pests. Application of ecological theory in classical and augmentative biological control. Offered in alternate years.—(I.) Kaya, Lewis

206. Nematode Systematics and Evolution (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100 or 110 or Entomology 156; Evolution and Ecology 100 recommended. Nematode diversity as revealed by morphological and molecular evidence. Laboratory experience focuses on structural features used in taxonomy. Phylogenetic relationships based on morphological and molecular data used to consider patterns of character change among taxa. Offered in alternate years.—(I.) Nadler

210. Molecular Phylogenetic Analysis (3)
Lecture—2 hours; laboratory—3 hours. Theory and practice of inferring phylogenetic trees using molecular sequence data. Practical techniques for obtaining sequence data, advantages and disadvantages of common approaches for inferring trees, statistical methods for comparing alternative hypotheses. (Same course as Evolution and Ecology 210.) Offered in alternate years.—(II.) Nadler

245. Field Nematology (1)
Fieldwork—6 days. Prerequisite: course 100. Six-day demonstration and field study in applied nematology including diagnosis and prediction of nematode field problem strategies for control field plot design, and establishment in association with diverse California crops. (S/U grading only.)—I. (I.)

290. Seminar (1)
Seminar—1 hour. (S/U grading only.)—II, III. (II, III.)

290C. Advanced Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. (S/U grading only.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Neurobiology, Physiology, and Behavior

(College of Biological Sciences)

Gregg H. Recanzone, Ph.D., Chairperson of the Department

Department Office. 196 Briggs Hall
(530) 752-0203; *http://www.npb.ucdavis.edu*

Faculty

Primary Department Members

Joseph F. Antognini, Ph.D., M.D. Professor *(Anesthesiology and Pain Medicine)*
Keith Baar, Ph.D. Assistant Professor
Sue C. Bodine, Ph.D., Professor *(Physiology & Membrane Biology)*
Kenneth H. Britten, Ph.D., Professor
Earl E. Carstens, Ph.D., Professor
Ernest S. Chang, Ph.D., Professor *(Animal Science)*
Barbara X. Chapman, Ph.D., Professor
Hwai-Jong Cheng, Ph.D., Associate Professor *(Pathology)*
Thomas P. Coombs-Hahn, Ph.D., Professor
William DeBello, Ph.D., Associate Professor
Jochen Ditterich, Ph.D., Assistant Professor
Charles A. Fuller, Ph.D., Professor
John D. Furlow, Ph.D., Professor
Jack M. Goldberg, Ph.D., Senior Lecturer
Mark S. Goldman, Ph.D. Assistant Professor *(Ophthalmology)*
Aldrin V. Gomes, Ph.D., Assistant Professor *(Physiology & Membrane Biology)*
Samantha P. Harris, Ph.D., Assistant Professor *(Physiology & Membrane Biology)*
David A. Hawkins, Ph.D., Professor
Barbara A. Horwitz, Ph.D., Distinguished Professor, *(Physiology & Membrane Biology) Academic Senate Distinguished Teaching Award, UC Davis Prize for Teaching and Scholarly Achievement*
Andrew T. Ishida, Ph.D., Professor *(Ophthalmology)*
Kim McAllister, Ph.D., Associate Professor *(Neurology)*
Lee Miller, Ph.D., Associate Professor
Alexander I. Mogilner, Ph.D., Professor *(Mathematics)*
Brian C. Mulloney, Ph.D., Professor
Gabrielle A. Nevitt, Ph.D., Professor
Pamela A. Pappone, Ph.D., Professor
Gregg H. Recanzone, Ph.D., Professor
Mitchell L. Sutter, Ph.D., Professor
James S. Trimmer, Ph.D., Professor *(Physiology & Membrane Biology)*
Martin W. Usrey, Ph.D., Professor *(Neurology)*
Craig H. Warden, Ph.D., Professor *(Pediatrics)*
W. Jeff Weidner, Ph.D., Professor
John S. Werner, Ph.D., Distinguished Professor *(Ophthalmology)*
Keith R. Williams, Ph.D., Senior Lecturer
Martin C. Wilson, Ph.D., Professor
John C. Wingfield, Ph.D., Endowed Chair Physiology Professor
Karen M. Zito, Ph.D., Assistant Professor

Emeriti Faculty

William C. Adams, Ph.D., Professor Emeritus
Marylynn S. Barkley, Ph.D., M.D., Associate Professor Emerita
James M. Boda, Ph.D., Professor Emeritus
Edmund M. Bernauer, Ph.D., Professor Emeritus
Leo M. Chalupa, Ph.D., Distinguished Professor Emeritus *(Ophthalmology)*
Harry W. Colvin, Ph.D., Professor Emeritus
Robert G. Holly, Ph.D., Senior Lecturer Emeritus
John M. Horowitz, Ph.D., Professor Emeritus *Academic Senate Distinguished Teaching Award*
Frederick W. Lorenz, Ph.D., Professor Emeritus
Williard S. Lotter, Ph.D., Senior Lecturer Emeritus
Peter R. Marler, Ph.D., Professor Emeritus
Verne E. Mendel, Ph.D., Professor Emeritus
Pamela A. Pappone, Ph.D., Professor, Emerita
E. Dean Ryan, Ed.D., Professor Emeritus
Arnold J. Sillman, Ph.D., Professor Emeritus *Academic Senate Distinguished Teaching Award*
Dorothy E. Woolley, Ph.D., Professor Emerita

Affiliated Faculty

Erwin A. Bautista, Ph.D., Lecturer
Gretchen Casazza, Ph.D., Assistant Adjunct Professor *(Sports Medicine Program)*
Ann V. Hedrick, Ph.D., Associate Adjunct Professor
Lauren C. Liets, Ph.D., Lecturer
Paul B. Salitsky, Ph.D., Lecturer
James D. Shaffrath, M.D., Lecturer
Marilyn Ramenofsky, Ph.D., Adjunct Professor
Grace L. Rosenquist, Ph.D., Assistant Adjunct Professor

The Exercise Biology Major Program

The Program. The focus is on both the acute and adaptive effects of physical activity (and inactivity). Exercise biology deals with the mechanisms and consequences of activity from the molecular to the organismal (human ecological) level. We examine these mechanisms and consequences during growth, development, aging, disease and in altered environmental conditions. The exercise biology major encompasses the critical aspects of an integrative program in applied human biology. The Bachelor of Arts program provides a greater breadth of knowledge in the humanities and social sciences and is more appropriate for those who wish to apply their knowledge within the human community. The Bachelor of Science program is appropriate for students who desire a strong preparation in human biology.

Advising and Career Alternatives. Meet with an Exercise Biology staff advisor or review the information available in the advising office to learn more about the best course sequences to take to prepare you for careers in basic exercise physiology, applied exercise physiology, or biomechanics; for graduate study in exercise physiology or biomechanics; or for professional programs in medicine, or physical therapy, athletic training or occupational therapy. Students with further academic or professional interests in medicine and other health sciences, community service, business, sales, communications, education or coaching might find the Bachelor of Arts program attractive. The Bachelor of Science could lead to further graduate study in any field related to human biology as well as careers in medicine and other health sciences (e.g., physical therapy), biomechanics and biomedical engineering and medical equipment and pharmaceutical development and sales.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**37-40**
Biological Sciences 2A-2B-2C	14
Chemistry 2A, 2B	10
Physics 1A-1B or 7A-7B	6-8
Psychology 1	4
Statistics 13, 32, 100, or 102	3-4
Psychology 41 recommended	
Depth Subject Matter	**40-45**
Biological Sciences 101	4
Neurobiology, Physiology, and Behavior 101	5
Exercise Biology 106 and 106L	7
Exercise Biology 101, 102, 103, 104L	15

One additional upper division course in Exercise Biology 3-4
Select one additional course from two of the three content areas listed below 6-10
Sociology and Culture option: African American and African Studies 100; Anthropology 101; Communication 165; Community and Regional Development 176; Exercise Biology 120; History 178B; Science and Society 105, 120; Science and Technology Studies 150; Sociology 122, 154, 159, 172
History and Philosophy option: Dramatic Art 141; History 135A, 135B, 136, 139A, 139B, 185A; Philosophy 108; Science and Technology Studies 130A, 130B, 131
Psychology and Communication option: Agricultural and Resource Economics 112, Communication 134, 136; Exercise Biology 121, 122; Human Development 100C; Psychology 101, 121, 126, 140
No variable unit courses or Exercise Biology 148, 148L may be used to fulfill these requirements. Consult your adviser regularly.

Total Units for the Major 77-85

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 55-73
Biological Sciences 2A-2B-2C 14
Chemistry 2A-2B-2C 15
Chemistry 8A-8B or 118A-118B-118C 6-12
Mathematics* 17A-17B-17C or 21A-21B (21C recommended) 8-12
Physics 7A-7B-7C or 9A-9B-9C-9D 12-20
*Mathematics 16A-16B-16C accepted to fulfill this requirement only for transfer students admitted prior to fall 2013.
Psychology 1 is highly recommended for all students.
Mathematics 21A-21B-21C-21D, 22A-22B, Physics 9A-9B-9C-9D and Engineering 6, 35 are recommended for students interested in graduate study in Biomechanics.

Depth Subject Matter 50-55
Biological Sciences 101, 104, 105, (102 + 103 may be substituted for 105) 10-13
Neurobiology, Physiology, and Behavior 101 5
Exercise Biology 106 and 106L 7
Exercise Biology 101, 102, 103, 104L 15
Statistics 100 or 102 4
Completion of 3 courses (9-11 units) selected from the following: (see advisor for help in selecting appropriate course sequences)
1 course from Group A 3-4
1 additional course from Group A or Group B 3-4
1 additional course from Groups A, B or C 3-4
Group A: Exercise Biology 111, 112, 115, or 126 (laboratory courses)
Group B: Exercise Biology 110, 113, 117, 124, 125, 179
Group C: Exercise Biology 122; Applied Science Engineering 115; Engineering 102; Neurobiology, Physiology, and Behavior 112, 113, 140; Nutrition 111AV
No variable unit courses or Passed/Not Passed graded courses may be used to fulfill these requirements. Consult your adviser regularly

Total Units for the Major 105-128

Minor Program Requirements:

UNITS

Exercise Biology 18
At least 18 upper division units in exercise biology from one of three options 18
(a) Biomechanics
(1) Exercise Biology 103.
(2) Exercise Biology 113, 115, 126.
(3) Additional courses to complete a total of 18 upper division units. None of the variable-unit courses or Exercise Biology 148, 148L may be used to fulfill these requirements. Consult your adviser regularly.
(b) Exercise Physiology
(1) Exercise Biology 101.
(2) Minimum of three courses from Exercise Biology 110, 111, 112, 113, 116, 117.
(3) Additional courses to complete a total of 18 upper division units. None of the variable-unit courses or Exercise Biology 148, 148L may be used to fulfill these requirements. Consult your adviser regularly.
(c) Psychological Aspects
(1) Exercise Biology 102.
(2) Exercise Biology 120, 121, 122.
(3) Additional courses to complete a total of 18 upper division units. None of the variable-unit courses or Exercise Biology 148, 148L may be used to fulfill these requirements. Consult your adviser regularly.

Master Adviser. Keith R. Williams for the Exercise Biology Major and Exercise Biology Minor

Honors Program. Those students with an outstanding academic record and an Exercise Biology GPA of 3.500 or higher may enter the Honors Program with the consent of a faculty adviser. An honors project must be completed consisting of 2 quarters of course 199 (at least 3 units per quarter), 2 units of course 194H, and an honors thesis. These units are taken in addition to the major requirements.

Graduate Study. A program of study and research leading to the M.S. degree is available through the Graduate Group in Exercise Science. For detailed information regarding graduate study, write to the Graduate Adviser, Graduate Group in Exercise Science. See also the Graduate Studies chapter of this catalog.

The Neurobiology, Physiology, and Behavior Major Program

Neurobiology, Physiology, and Behavior is a major that emphasizes the understanding of vital functions common to all animals. All animals perform certain basic functions—they grow, reproduce, move, respond to stimuli, and maintain homeostasis. The physiological mechanisms upon which these functions depend are precisely regulated and highly integrated. Actions of the nervous and endocrine systems determine behavior and the interaction between organisms and their physical and social environments. Students in this major study functional mechanisms; the control, regulation, and integration of these mechanisms; and the behavior that relates to those mechanisms. They do so at the level of the cell, the organ system, and the organism.

The Program. In the freshman and sophomore years, students majoring in Neurobiology, Physiology, and Behavior build a broad scientific background, taking courses in chemistry, biology, physics, and mathematics. As juniors or seniors, students can enroll in a variety of Neurobiology, Physiology, and Behavior courses and related upper division courses. Students can participate in a number of advanced laboratory courses or may design an individual, independent project guided by a member of the faculty.

Career Alternatives. Completion of the Neurobiology, Physiology, and Behavior major provides the foundation for advanced study leading to careers in high school teaching, college level teaching or research. It also serves as the basis for further training in the health professions, including but not limited to human and veterinary medicine, medical technology, physical therapy, pharmacy, dentistry and optometry. The major is also appropriate for those intending to seek careers in biotechnology or other biologically related industries.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 55-65
Biological Sciences 2A-2B-2C 14
Chemistry 2A-2B-2C 15
Chemistry 8A-8B or 118A-118B-118C 6-12
Mathematics* 17A-17B-17C or 21A-21B (21C recommended) 812
Physics 7A-7B-7C 12
*Mathematics 16A-16B-16C accepted to fulfill this requirement only for transfer students admitted prior to fall 2013.

Depth Subject Matter 47-52
Biological Sciences 101, 105 (or 102 + 103), 104 10-13
Neurobiology, Physiology, and Behavior 100, 101, 101L, 102 15
Select three or more units of laboratory course work from the following list 3
Neurobiology, Physiology, and Behavior 104L, 106, 111C, 111L, 160L, 194H; other courses with the approval of the master adviser.
Statistics 100 4
Additional Neurobiology, Physiology, and Behavior depth unit requirement 12
All other Neurobiology, Physiology, and Behavior courses not used in satisfaction of any other requirement; or Anthropology 154A, 154C; or Entomology 104; or Exercise Biology 101, 102, 111. Courses 192, 197T, 199 may not be used to satisfy the depth unit requirement.
One course from Anthropology 151, Evolution and Ecology 100, Geology 107 3-4

Total Units for Major 102-117

Minor Program Requirements:

Human Physiology 20
Exercise Biology 101 4
Neurobiology, Physiology, & Behavior 101 5
One course from Exercise Biology 102, 110, 111, 113, 116, 117, 125
One course from Neurobiology, Physiology, & Behavior 112, 113, 114, 122, 130, 132, 168
One course from two of the following areas:
Functional Anatomy: Cell Biology and Human Anatomy 101; Anthropology 156
Genetics And Development: Anthropology 153; Human Development 100C, 101, 117; Molecular and Cellular Biology 162
Immunology: Medical Microbiology 188
Nutrition: Nutrition 111B

Neuroscience 18
Neurobiology, Physiology, & Behavior 100 4
Five courses from:
Choose at least four from following: Neurobiology, Physiology, & Behavior 103, 112, 124, 126, 160, 161, 162, 163, 164, 165, 168, 169
One of the following may be completed to fulfill course requirement: Psychology 113, 121, 129, Linguistics 175, Philosophy 103, Human Development 163
The following courses are cross-listed and either offering can be used to fulfill the course requirement: NPB 124/PSC 124, NPB 160/NSC 160

Master Adviser. _____

Advising Center. 188 Briggs Hall (530) 752-9696

Graduate Study. Information on graduate study in neuroscience, physiology or behavior may be obtained by writing the Graduate Adviser, Graduate

Group Complex. See also the graduate course offerings listed under Animal Behavior (A Graduate Group), on page 147, Molecular, Cellular, and Integrative Physiology (A Graduate Group), on page 420, Neuroscience, on page 437 and Physiology, on page 456. See also Graduate Studies, on page 109.

Courses in Exercise Biology (EXB)

Lower Division Courses

10. Exercise and Fitness: Principles and Practice (3)
Lecture—3 hours. Human movement from physiological, psychological, sociological, and historical perspectives. Biology and psychology of exercise across the human lifespan. Not open for credit to students who have completed an upper division Exercise Biology course. GE credit: SciEng, Div.—I, II. (I, II.) Salitsky, Shaffrath

90C. Research Conference (1)
Discussion—1 hour. Prerequisite: lower division standing in Exercise Biology or related biological science and consent of instructor; concurrent enrollment in course 99. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

90X. Lower Division Seminar (1-2)
Lecture—1-2 hours. Prerequisite: lower division standing and consent of instructor. Gives freshman or sophomore level students the opportunity to study a special topic in the general area of Exercise Biology in a small class setting.

92. Exercise Biology Internship (1-5)
Internship—3-15 hours. Prerequisite: consent of instructor, dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated one time for credit. (P/NP grading only.)

97T. Tutoring in Exercise Biology (1-5)
Tutorial—3-15 hours. Prerequisite: lower division standing and consent of instructor. Assisting the professor by tutoring students in exercise biology course-related projects. May be repeated for credit for 10 units including courses 97TC, 197T and 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.)—I, II, III. (I, II, III.)

97TC. Tutoring Exercise Biology in the Community (1-5)
Tutorial—3-15 hours. Prerequisite: consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated one time for credit. (P/NP grading only.)

98. Directed Group Study
Prerequisite: consent of instructor and chairperson. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor.
(P/NP grading only.)

Upper Division Courses

101. Exercise Physiology (4)
Lecture—4 hours. Prerequisite: Neurobiology, Physiology, and Behavior 101. Physiologic responses to acute exercise, and physiologic adaptations to both chronic exercise (training) and selected environmental stresses. Emphasis on the muscular, metabolic, cardiovascular, respiratory and renal responses and adaptations to exercise. Only 1 unit of credit allowed to students who have completed Exercise Science 101. Only 3 units of credit allowed to students who have completed Exercise Science 102. Not open for credit to students who have completed Exercise Science 101 and 102 (Former Exercise Science 101 and 102).—I. (I.) Bodine, Shaffrath

102. Introduction to Motor Learning and the Psychology of Sport and Exercise (4)
Lecture—4 hours. Prerequisite: Psychology 1 recommended. Theoretical and practical issues in motor learning, sport psychology, and exercise psychology. Emphasis on how motor skills are acquired and retained, and on the application of social psychology and human motivation studies to human performance. Only 2 units of credit allowed to students who have completed Exercise Science 104. Only 2 units of credit allowed to students who have completed Exercise Science 105. Not open for credit to students who have completed Exercise Science 104 and 105. (Former Exercise Science 104 and 105.) GE credit: SocSci.—I, II. (I, II.) Salitsky

103. Analysis and Control of Human Movement (4)
Lecture—4 hours. Prerequisite: Cell Biology and Human Anatomy 101 and 101L, Physics 7A and 7B. Neurobiology, Physiology, and Behavior 101 recommended. Introduction to functional anatomy, neurophysiological basis of motor control, and biomechanics of human movement. Human movement understood in the context of body structures, basic principles of physics, and functional characteristics of nerve and muscle. Only 1 unit of credit allowed to students who have completed Exercise Science 103. Only 3 units of credit allowed to students who have completed Exercise Science 104. Not open for credit to students who have completed Exercise Science 103 and 104. (Former Exercise Science 103 and 104.)—III. (III.) Williams

104L. Exercise Biology Laboratory (3)
Laboratory—3 hours; lecture—1 hour; discussion—1 hour. Prerequisite: course 101, 102, 103 (the last course may be taken concurrently). Principles and analytical procedures for assessing fundamental physiological, biomechanical, motor learning and motor control factors which underlie human movement and performance. Only 1 unit of credit allowed to students who have completed Exercise Science 101L. Only 1 unit of credit allowed to students who have completed Exercise Science 103. Not open for credit to students who have completed Exercise Science 101L and 103. GE credit: Wrt.—I, III. (I, III.) Shaffrath

106. Human Gross Anatomy (4)
Lecture—4 hours. Prerequisite: Biological Sciences 2A; concurrent enrollment in course 106L or Cell Biology and Human Anatomy 101L strongly recommended. Upper division students only; Pass 1 open to upper division Exercise Biology or Anthropology majors only; Pass 2 open to Seniors in any major; Open enrollment at the start of the quarter for upper division students in any major. Detailed study of the gross anatomical structure of the human body, with emphasis on function and clinical relevance to students entering health care professions. (Same course as Cell Biology and Human Anatomy 101.) GE Credit: SciEng.—II. (II.) Gross

106L. Human Gross Anatomy Laboratory (3)
Laboratory—9 hours. Prerequisite: Biological Sciences 2A; must take course 106 or Cell Biology and Human Anatomy 101 concurrently (or have already completed). Upper division students only; Pass 1 open to upper division Exercise Biology or Anthropology majors only; Pass 2 open to Seniors in any major; Open enrollment at the start of the quarter for upper division students in any major; mandatory attendance on first day of lab. Detailed study of prosected human cadavers in small group format with extensive hands-on experience. (Same course as Cell Biology and Human Anatomy 101L.) GE Credit: SciEng.—II. (II.) Gross

110. Exercise Metabolism (3)
Lecture—3 hours. Prerequisite: course 101 or Neurobiology, Physiology and Behavior 101. Exercise metabolism, with emphasis on skeletal muscle and cardiac muscle metabolism during activity and inactivity. Basics of bioenergetics, substrate utilization, and cell signaling; mechanisms that regulate these properties, and differences between skeletal muscle and cardiac muscle metabolism.—II. (II.) Gomes

111. Environmental Effects on Physical Performance (3)
Lecture—2 hours; discussion/laboratory—3 hours. Prerequisite: courses 101 or consent of instructor. The effects of thermal, barometric and gravitational conditions on physiological function and physical performance of humans. Acute and chronic effects, emphasizing physiological adaptations and limitations, will be studied.—II. (II.) Shaffrath

112. Clinical Exercise Physiology (4)
Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: courses 101 or consent of instructor. Physical activity as a therapeutic modality in normal and diseased populations (cardiovascular, pulmonary, diabetic). Effects of exercise and inactivity in terms of normal physiology, pathophysiology, and therapeutic benefit. Exercise fitness and disease assessment methods.—II. (II.) Harris

113. Growth and Development in Human Performance (3)
Lecture—3 hours. Prerequisite: Cell Biology and Human Anatomy 101, and Neurobiology, Physiology, and Behavior 101. Development of human performance potential from conception to old age, including influence of exercise, athletic participation, and preventive medicine. Alterations in motor skill patterns, morphology, and body composition, and physiological capacities with aging. GE credit: SciEng.—III. (III.) Salitsky, Shaffrath

115. Biomechanical Bases of Movement (3)
Lecture—2 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: course 103 or consent of instructor. Biomechanical bases of human movement investigated; topics include musculo-skeletal mechanics, tissue mechanics, electromyography, and measurement and analysis techniques. Application made to sport, clinical, and work environments, including extensive analysis of locomotion. GE credit: SciEng.—I. (I.) Williams

116. Nutrition for Physically Active Persons (3)
Lecture—3 hours. Prerequisite: course 101, Neurobiology, Physiology, and Behavior 101. The role of nutrition and exercise in modifying metabolism, body composition, performance and health of humans.

117. Exercise and Aging in Health and Disease (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 101 or 113 (concurrently). Etiology of and standard therapy for various diseases associated with aging (e.g., cardiovascular, pulmonary, and renal diseases, diabetes, obesity, lipemias, etc.). Exercise will then be considered as a protective and/or therapeutic modality. GE credit: SciEng.—III. (III.) Shaffrath

120. Sport in American Society (3)
Lecture—3 hours. Sociological approaches to the study of sport and contemporary American culture, including sport interaction with politics, economics, religion, gender, race, media and ethics. Socialization factors involving youth, scholastic, collegiate, and Olympic sport. (Same course as Physical Education 120.) GE credit: SocSci, Div.—I, IV. (I, IV.) Salitsky

121. Advanced Sport Psychology (3)
Lecture—3 hours. Prerequisite: course 102; Psychology 1 recommended. Advanced study and consideration of major theoretical and practical issues in sport psychology. Emphasis on practical application to sport and human performance.—II. (II.) Salitsky

122. Psychological Effects of Physical Activity (3)
Lecture—3 hours. Prerequisite: Psychology 1; upper division standing. Physical activity is evaluated in terms of its ability to enhance the quality of life. Topics studied include: individual factors (self concept, type A); special populations (elderly, cardiovascular); and mental health changes (depression, anxiety).—III. (III.) Salitsky

124. Physiology of Maximal Human Performance (4)
Lecture—3 hours; practice—4 hours. Prerequisite: course 101 or permission of instructor; Biological Sciences 101, 102, and 103 recommended. Molecular mechanisms underlying adaptation to training. Learn how to exercise to maximize their own performance as well as learning how the frequency, intensity and timing of exercise and nutrition affect the molecular signals that underlie performance.—I. (I.) Baar

125. Neuromuscular and Behavioral Aspects of Motor Control (3)
Lecture—2 hours; lecture/discussion—2 hours. Prerequisite: course 101. Factors which affect control of movement from neuropsychological, physiological, behavioral, and mechanical viewpoints. Topics include central vs. peripheral control mechanisms, open and closed loop theories, motor programming, cognitive learning strategies, and the effects of biochemical and biomechanical influences.—Bodine

126. Tissue Mechanics (3)
Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: course 103 or Engineering 45 or consent of instructor. Structural and mechanical properties of biological tissues including bone, cartilage, ligaments, tendons, nerves, and skeletal muscle. (Same course as Biomedical Engineering 126.) GE credit: SciEng.—II. (II.) Hawkins

148. Theory and Practice of Exercise Testing (1)
Lecture/discussion—1 hour. Prerequisite: course 112 (may be taken concurrently). Theory and practice of exercise testing applied to older adult populations. Physiological responses to and limitations of exercise testing. Application of exercise testing and training to healthy and diseased populations. (P/NP grading only.)—Casazza

148L. Adult Fitness Testing Laboratory (1)
Laboratory—3 hours. Prerequisite: courses 148 (concurrently). Testing symptomatic and asymptomatic older adults for functional aerobic capacity, body composition, blood lipids, pulmonary function, and cardiovascular disease risk. Counseling adults in appropriate exercise programs and lifestyle modifications. Two quarters minimum; third quarter permitted. May be repeated two times for credit. (Former course Physical Education 148L) (P/NP grading only.)—Casazza

179. Frontiers in Exercise Biology (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 101, 102 and 103 (may be taken concurrently); 104L recommended. Lectures by leading authorities and discussion of the latest research in newly emerging areas in exercise biology. Offered every fourth year.—III.

189. International Perspectives in Exercise Biology (4)
Lecture—4 hours. Prerequisite: course 10 or upper division standing in Exercise Biology; consent of instructor: students will be accepted based upon academic merit, personal experience, and academic discipline in order to provide multidisciplinary perspectives. Compare and contrast exercise science issues between the US and an international location. Identify political, economic, cultural, technological and environmental issues that impact human exercise, physical activity, wellness, and sport from a global perspective. Limited enrollment. Offered irregularly.

190C. Research Conference (1)
Discussion—1 hour. Prerequisite: upper division standing in Exercise Biology or related biological science and consent of instructor; concurrent enrollment in course 199. Research findings and methods in exercise biology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)—I. II, III. (I. II, III.)

192. Exercise Biology Internship (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor, dependent on availability of intern positions. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under program faculty supervision. Written report required. May be repeated up to 15 units of credit, including course 92. (P/NP grading only.)

194H. Research Honors (2)
Independent study—6 hours. Prerequisite: senior standing, minimum of 6 units of course 199, 3.500 GPA or greater in major courses, consent of honors thesis adviser. Completion of individual honors research project in Exercise Biology, under the guidance of an Exercise Biology faculty adviser, culminating in written honors thesis. (P/NP grading only.)—I, II, III. (I, II, III.)

197T. Tutoring in Exercise Biology (1-5)
Tutorial—3-15 hours. Prerequisite: upper division standing and consent of instructor. Assisting the instructor by tutoring students in exercise biology course-related projects. May be repeated up to 10 units of credit including courses 97T, 97TC and 197TC. No tutorial units will be counted towards the Exercise Biology major. (P/NP grading only.)—I, II, III. (I, II, III.)

197TC. Tutoring Exercise Biology in the Community (1-5)
Tutorial—3-15 hours. Prerequisite: consent of instructor and chairperson. Tutoring in the community in exercise biology related projects under the guidance of the faculty. May be repeated up to 10 units of credit including courses 97T, 97TC, 197T. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor and chairperson. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of chairperson. (P/NP grading only.)

Courses in Neurobiology, Physiology, and Behavior (NPB)

Lower Division Courses

10. Elementary Human Physiology (3)
Lecture—3 hours. Introduction to physiology for non-science majors. Includes basic cell physiology and survey of major organ systems and how they function in homeostasis and human health. Not open for credit to students who have completed course 101. GE credit: SciEng.—II. (II.) Antognini, Bautista

12. The Human Brain and Disease (3)
Lecture—3 hours. Normal function and diseases of the human brain and nervous system. Diseases discussed include Parkinson's, Alzheimer's, leprosy, amnesia and schizophrenia. Intended for non-science majors. Not open for credit to students who have completed courses 100, 101, 112, or Psychology 121. GE credit: SciEng.—I. (I.) Cheng

14. Illusions: Fooling the Brain (3)
Lecture—3 hours. Introduction to perceptual processing in the human nervous system; illusions. GE credit: SciEng.—II. (II.) Ditterich

15. The Physiology of Human Aging (4)
Lecture—3 hours; discussion—1 hour. A broad examination of age-associated changes in body functions. Includes basic cell physiology, a survey of major organ systems and the age-induced alterations in system function. Some age associated diseases will also be examined. Intended for non-science majors. Not open for credit to students who have completed Biological Sciences 15. GE Credit: SciEng.—I. (I.) Bautista

68. Biology of Drug Addiction and Abuse (3)
Lecture—3 hours. Broad examination of addictive substances and their use/abuse. Topics include historical perspective, physiological effects, etiology, neurobiology of addiction and the impact of drugs on contemporary society. Intended for non-science majors. Not open for credit to students having completed course 168. GE Credit: SciEng.—III. (III.) Bautista

90A. Lower Division Seminar: Issues in Body Weight Regulation (2)
Seminar—2 hours. Prerequisite: lower division standing, consent of instructor. Critical examination of issues in body weight regulation through shared readings, discussions, written assignments, debates and oral presentations. Limited enrollment.—II. (II.) C. Warden

90B. Human Color Perception (2)
Seminar—2 hours; term paper. Prerequisite: lower division standing. The neural determinants of color appearance, and why we see the world in the way we do. Discussions center around demonstrations of color phenomena and what they tell us about the human brain. Limited enrollment.—II. Werner

90C. Current Issues in Animal Behavior (2)
Seminar—2 hours. Prerequisite: lower division standing. The mechanisms and outcomes of sexual selection (mate choice and mate competition). Theory, current models and evidence that supports or refutes the models. Limited enrollment.—III. (III.) Hedrick

90D. Lower Division Seminar: Current Issues in Reproductive Endocrinology (2)
Seminar—2 hours. Prerequisite: lower division standing. The integrative roles of reproductive hormones in mammalian reproduction and health. Current theory and models regarding hormone function and use in reproductive health and contraception, and evidence that supports or refutes the models.

90E. Biology of Aging (2)
Seminar—2 hours. Prerequisite: freshman standing. Current theories on the biology of aging covering genetic, biochemical, and physiological aspects. Emphasis on critical evaluation of controversial and contemporary issues.

90F. Visual Impairment and Blindness: A World Wide Problem (2)
Seminar—2 hours. Prerequisite: lower division standing. Examination of various abnormalities of the eye and the important geographic and cultural factors that influence the epidemiology of those abnormalities.

91C. Research Conference (1)
Discussion—1 hour. Prerequisite: Lower division standing in Neurobiology, Physiology, and Behavior or related biological science and consent of instructor; concurrent enrollment in course 99. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. (P/NP grading only.)—I, II, III. (I, II, III.)

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Neurobiology, Physiology, and Behavior. Internships supervised by a member of the faculty. May be repeated once for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

98. Directed Group Study (1-5)
Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Neurobiology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1AB or 2ABC; Physics 9 ABC or 7ABC. Brains and nervous systems, neurons and neural circuits. Coordination of movement. Development of nervous systems. Vision, hearing, and feature extraction by the central nervous system. The cell biology of learning and memory. Not open for credit to students who have completed course 112, 160, 161 or 162, or Neuroscience 221 or 222.—I, II, III. (I, II III.) Chapman, Cheng, Mulloney, Sutter

100Q. Quantitative Foundations of Neurobiology (1)
Autotutorial—0.5 hours; extensive problem solving—0.5 hours. Prerequisite: course 100 (may be taken concurrently). Computational methods and mathematical models used to study phenomena in neurobiology.—III. (III.) Chapman, Cheng, Mulloney, Sutter

101. Systemic Physiology (5)
Lecture—5 hours. Prerequisite: Biological Sciences 1A, or 2A and Chemistry 2B; Physics 1B or 7C strongly recommended. Systemic physiology with emphasis on aspects of human physiology. Functions of major organ systems, with the structure of those systems described as a basis for understanding the functions. Only three units of credit awarded for students having taken Biomedical Engineering 116.—I, II, III. (I, II, III.) Bautista, DeBello, Fuller, Furlow, Ishida, Harris, Goldberg, Usrey, Weidner, Wingfield, Zito

101L. Systemic Physiology Laboratory (3)
Laboratory—3 hours; discussion—2 hours; term paper. Prerequisite: course 101.Selected experiments to illustrate functional characteristics of organ systems discussed in course 101.—I, II, III. (I, II, III.) Bautista, Goldberg, Liets

102. Animal Behavior (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C. Basic principles of behavioral organization in vertebrate and invertebrate animals. Underlying physiological and ethological mechanisms. The evolution of behavior, with special emphasis on behavior under natural conditions. Not open for credit to students who have completed course 155. (Former course 155.)—II, III. (II, III.) Hahn, Nevitt

102Q. Quantitative Topics in Animal Behavior (1)
Autotutorial—1.5 hours; extensive problem solving—1.5 hours. Prerequisite: Mathematics 16B; course 102 (may be taken concurrently). Study of the quantitative concepts and exemplar models used in animal behavior. Offered irregularly. GE Credit: SciEng.—Hahn

103. Cellular Physiology/Neurobiology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 103 or 105, and 104; Physics 7C recommended. Cellular physiology with emphasis on membrane transport processes and neuronal physiology. Fundamental physical-chemical and biological mechanisms of membrane transport will be considered in relation to cytoplasmic homeostasis, communication between cells, and the cellular mechanisms of sensory and motor transduction. Not open for credit to students who have completed course 100B (Former course 100B.)

104L. Cellular Physiology/Neurobiology Laboratory (4)
Lecture—1 hour; laboratory—3 hours; discussion—1 hour; term paper or discussion. Prerequisite: courses 101 and 101L; Biological Sciences 103 or 105. Experiments in the physical and chemical processes of cells and tissues. GE Credit: Wrt.—II. (II.) Liets

105. Introduction to Computer Models (4)
Lecture—3 hours; lecture/laboratory—1 hour. Prerequisite: Mathematics 16C or the equivalent, Physics 7C, Chemistry 2C, and course 100 or 101. Introduction to the ideas, mathematical techniques and computer tools required for developing models of cellular processes in physiology and neurobiology. Applications include membrane transport, ionic channels, action potentials, Ca^{2+} oscillations, respiration, and muscle contraction.

106. Experiments in Neurobiology, Physiology, and Behavior: Design and Execution (3)
Laboratory—7.5 hours; discussion—0.5 hours. Prerequisite: course 100 or 101 or 102, and 199 and consent of instructor. Design and execution of experiments in neurobiology, physiology, and/or behavior. Students choose and design a project in consultation with the sponsoring faculty member. May be repeated one time for credit to complete the project, with consent of instructor. An additional repeat is permitted for a different project under the guidance of another faculty member. (P/NP grading only.)—I, II, III. (I, II, III.) Rosenquist

107. Cell Signaling in Health and Disease (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102 or 105. Basics of cell signaling pathways, their disruption in disease, and their current utility and future potential as therapeutic targets. Focus is on signaling pathways specific to nervous, endocrine and immune systems, and those fundamental to all cells.—II. (II.) Trimmer

111C. Advanced Systemic Physiology Laboratory (3)
Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 101, 101L, Statistics 13; course 112, 113, or 114 recommended. Interfacing physiological recording equipment with microcomputers; data acquisition and analysis using the microcomputer; data interpretation within the framework of physiological concepts.

111L. Advanced Systemic Physiology Laboratory (4)
Lecture—1 hour; discussion—2 hours; laboratory—6 hours; term paper. Prerequisite: courses 101 and 101L. Selected comprehensive experiments in the autonomic nervous system and the cardiovascular, respiratory, and neuromuscular systems. Emphasis on conceptual and methodological approaches in demonstrating the physiology of organ systems. GE credit: Wrt.—I, III. (I, III.) Liets

112. Neuroscience (3)
Lecture—3 hours. Prerequisite: course 100 or 101. Presentation of concepts in neuroscience including sensory systems, motor systems, and higher neural integration. Emphasis on mammalian nervous system.—II. (II.) Carstens

113. Cardiovascular, Respiratory, and Renal Physiology (4)
Lecture—4 hours. Prerequisite: course 101; Chemistry 8B, Physics 7B and 7C recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance.

114. Gastrointestinal Physiology (3)
Lecture—3 hours. Prerequisite: course 101; Biological Sciences 105 or 103 recommended, 105 preferred. Gastrointestinal anatomy and physiology. Digestion, secretion, absorption, motility, comparative physiology and pathology. Strong emphasis on neural and hormonal regulation and on cellular mechanisms of secretion and absorption.—I. (I.) Bautista

117. Avian Physiology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1B, or 2A and 2B and Chemistry 2B; course 101 strongly recommended. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine systems.—III. (III.) Millam

121. Physiology of Reproduction (4)
Lecture—4 hours. Prerequisite: course 101. Physiological mechanisms related to reproduction, breeding efficiency and fertility, with special reference to domestic animals.—II. (II.) Berger

121L. Physiology of Reproduction Laboratory (1)
Laboratory—3 hours. Prerequisite: course 121 recommended (may be taken concurrently). Experiments on the reproductive systems of domestic animals including male and female gametes. (P/NP grading only.)—II. (II.) Berger

122. Developmental Endocrinology (3)
Lecture—3 hours. Prerequisite: course 101. Hormonal control of development, maturation and senescence from the cellular to organismal level, with emphasis on the human. Prenatal and neonatal life, childhood and adolescence, adulthood and pregnancy, as well as the endocrinology of aging.

123. Comparative Vertebrate Organology (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Science 1A and 1B or 2A and 2B. Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (Same course as Anatomy, Physiology and Cell Biology 100.)

124. Comparative Neuroanatomy (4)
Lecture—3 hours; laboratory—2 hours. Prerequisite: Psychology 101, or course 100 or 101. Overview of the neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (Same course as Psychology 124.)—II. (II.) Krubitzer, Recanzone

125. Comparative Physiology: Neurointegrative Mechanisms (3)
Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: neurointegrative mechanisms of integration including aspects of phylogenetic development at both neuronal and systemic levels.

126. Comparative Physiology: Sensory Systems (3)
Lecture—3 hours. Prerequisite: course 100 or 101. Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechanosensitive systems (audition, lateral lines, touch, echolocation, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photosensitive systems (vision, infrared detection, UV detection), electroreception, and pain. Emphasis on receptors.

127. Comparative Physiology: Circulation (3)
Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: circulation. Comparative approach to cardiovascular function in vertebrates and invertebrates.—Weidner

128. Comparative Physiology: Endocrinology (3)
Lecture—3 hours. Prerequisite: course 101. Comparison of physiological functions in the animal kingdom: animal hormones and their functions.—II. (II.) Furlow, Chang

129. Comparative Physiology: Respiration (3)
Lecture—3 hours. Prerequisite: course 101. Comparisons of physiological functions in the animal kingdom: respiration.

130. Physiology of the Endocrine Glands (4)
Lecture—4 hours. Prerequisite: course 101. Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease.—I. (I.) Adams

132. Nature vs. Nurture: Physiological Interactions Among Genes, Nutrients and Health (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A or 2A or consent of the instructor. Biochemical, physiological, genetic, and nutritional causes of important medical problems such as obesity, anorexia, heart disease and diabetes. One unit of credit allowed to students who have completed course 131. GE Credit: SciEng.—I. (I.) Warden

139. Frontiers in Physiology (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 100 and 101; 102 (may be taken concurrently). Lectures by leading authorities and discussion of the latest research in newly emerging areas in physiology. Offered every third year.—(III.)

140. Principles of Environmental Physiology (3)
Lecture—3 hours. Prerequisite: course 101; Biological Sciences 102 recommended. Physiological aspects of interactions of organisms and environmental, cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure, gravity and light environmental variables. Not open for credit to students who have completed course 148. (Former course 148.)—II. Fuller

141. Physiological Adaptation of Marine Organisms (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: upper division standing; consent of the instructor; residence at Bodega Marine Laboratory required. Students must submit application available at http://www.bml.ucdavis.edu. Physiological adaptation to the environment among organisms in marine and estuarine habitats.—III. (III.) Chang, Cheng, Cherr

141P. Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (5)
Laboratory—12 hours; discussion—1 hour. Prerequisite: course 141 concurrently; residence at Bodega Marine Laboratory required. Students must submit application available at http://www.bml.ucdavis.edu. Training in scientific research from hypothesis to publication, including methods of library research. Research related to a topic covered in course 141.—III. (III.) Chang, Cherr

150. Advanced Animal Behavior (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 102 or Psychology 101. Advanced integrative survey of biological principles of behavioral organization, emphasizing historical roots, current research directions, conceptual issues and controversies. Laboratory exercises on the description and analysis of the behavior of captive and free-living animals. (Same course as Psychology 122.)—II. (II.) Owings

152. Hormones and Behavior (3)
Lecture—3 hours. Prerequisite: course 101, and either course 102 or Psychology 101. Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. (Same course as Psychology 123.)—III. (III.) Furlow, Hahn

159. Frontiers in Behavior (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 100, 101, 102. Lectures by leading authorities and discussion of the latest research in newly emerging areas in behavioral biology. Offered every third year.—III.

160. Molecular and Cellular Neurobiology (3)
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: course 100, Biological Sciences 101 and consent of instructor. Selected topics in neurobiology. Topics include channel biophysics, action potential propagation, intracellular signal transduction pathways, synaptic physiology and quantal analysis, cellular mechanisms of synaptic plasticity, and neuromodulation of synaptic circuitry. (Same course as Neuroscience 160.)—(III.) Burns, Mulloney

160L. Advanced Cellular Neurobiology Laboratory (4)
Laboratory—12 hours. Prerequisite: course 160, Physics 7C recommended. Students will learn to record neural activity, to interpret their recordings, and to label neurons with antibodies against neurotransmitters. Mulloney

161. Developmental Neurobiology (3)
Lecture—3 hours. Prerequisite: course 100 or 101. Issues, theoretical concepts, and methodologies in developmental neurobiology. Topics include prenatal and postnatal differentiation of neurons, and plasticity in the mature and aging brain. Integration of neurochemical, structural, physiological and behavioral perspectives.—III. (III.) McAllister, Zito

162. Neural Mechanisms of Behavior (3)
Lecture—3 hours. Prerequisite: course 100 or 101. The relationship between brain and behavior. Identification and analysis of the relevant neural circuits involved. Examples of systems to be considered are birdsong, locomotion, echolocation.—III. (III.) Britten

164. Mammalian Vision (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100, 112, or Psychology 101. Structure and function of the mammalian visual system, from the formation of images on the retina through visually guided behavior and perception. Emphasis on biological mechanisms underlying vision.—II. Werner

165. Neurobiology of Speech Perception (3)
Lecture—3 hours. Prerequisite: course 100 or 101, or consent of instructor. Interdisciplinary approach to speech perception with emphasis on functional neuroanatomy and behavior. Topics include auditory processing in time and space, intelligibility in noisy environments, visual speech, evolution of vocal communication, models of speech perception, development, and hearing impairment.—I. (I.) Miller

166. Math Tools for Neuroscience (4)
Lecture—4 hours. Prerequisite: course 100 or permission of instructor; Math 16A, B, C or equivalent; Physics 7C strongly recommended. Introduction to mathematics techniques used in neuroscience. Applications to neuroscience of differential equations, linear algebra, Fourier transforms, correlation and convolution, and probability theory. Offered in alternate years.—I. Goldman

167. Computational Neuroscience (5)
Lecture—4 hours; lecture/laboratory—3 hours. Prerequisite: course 100 or permission of instructor; Math 16A, B, C or equivalent; Physics 7A, B, C or equivalent strongly recommended. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. Offered in alternate years.—(I.) Goldman

168. Neurobiology of Addictive Drugs (4)
Lecture/discussion—4 hours. Prerequisite: course 100 or 101 or the equivalent. Neurobiological basis for the effects and mechanisms of action of drugs with addictive potential, including opiates (morphine, heroin, methadone), amphetamines, cocaine, nicotine, marijuana (cannabinoids), alcohol, caffeine, and mind-altering drugs such as LSD and antidepressants.—III. (III.) Liets

169. Frontiers in Neurobiology (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: courses 100 and 101, course 102 (may be taken concurrently). Lectures by leading authorities and discussion of the latest research in newly emerging areas in neurobiology. Offered every third year.—III.

190C. Research Conference (1)
Discussion—1 hour. Prerequisite: upper division standing in Neurobiology, Physiology, and Behavior or related biological science and consent of instructor; concurrent enrollment in course 199. Research findings and methods in neurobiology, physiology, and/or behavior. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in neurobiology, physiology, & behavior. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

194HA-194HB-194HC. Neurobiology, Physiology, and Behavior–Honors (1-4-2)
Laboratory—3-12 hours. Prerequisite: senior standing; minimum 3.500 GPA in courses counted toward major; approval by the Master Adviser. Honors project in Neurobiology, Physiology, and Behavior. Laboratory research on a specific question. The project is developed with the sponsoring faculty member and approved by the student's Honors Thesis Committee. Honors thesis to be submitted upon completion of the project. (P/NP grading only.)—I, II, III. (I, II, III.)

197T. Tutoring in Neurobiology, Physiology, and Behavior (1-5)
Discussion—2-6 hours. Prerequisite: upper division standing and consent of instructor. Assisting the instructor by tutoring students in one of the Department's regular courses. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

211. Advanced Topics in Neuroimaging (2)
Seminar—2 hours. Prerequisite: Psychology 210 or consent of instructor. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. Limited enrollment. (Same course as Neuroscience 211 and Psychology 211.) (S/U grading only.)—II. (II.) Miller

212. Light and Fluorescence Microscopy (2)
Lecture—2 hours. Prerequisite: consent of instructor. Restricted to maximum 16 students. Theory and practical application of light and fluorescence microscopy in the biological sciences. (S/U grading only.)—II. (II.) Zito

217. Advanced Avian Physiology (1)
Project—1 hour. Prerequisite: graduate standing and concurrent enrollment in course 117; consent of instructor. Study in depth of a topic in avian physiology through development of a lecture with associated instructional materials such as lesson plan, readings, presentation, and evaluation aids.—III. (III.) Millam

222. Systems Neuroscience (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Same course as Neuroscience 222.)—II. (II.) Usrey

245. Computational Models of Cellular Signaling (3)
Lecture—3 hours. Prerequisite: consent of instructor. Computational and mathematical techniques in modeling of regulatory and signaling phenomena in neurobiology and cell physiology, focusing on linear and nonlinear ordinary differential equation models. Applications include ion channel kinetics, electrical activity, signal transduction, calcium oscillations, and simple neural circuits.—II. (II.)

247. Topics in Functional Neurogenomics (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (Same course as Neuroscience 247.)

261A. Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/discussion—2 hours. Prerequisite: graduate standing, course 100 or 112 or the equivalent. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Same course as Neuroscience 261A and Molecular, Cellular, and Integrative Physiology 261A.) (S/U grading only.)—(I.) Ishida

261B. Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/discussion—2 hours. Prerequisite: consent of instructor, course 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Same course as Neurobiology, Physiology, and Behavior 261B and Molecular, Cellular, and Integrative Physiology 261B.) (S/U grading only.) Offered in alternate years.—II. Britten

261C. Topics in Vision: Clinical Vision Science (2)
Lecture/discussion—2 hours. Prerequisite: courses 261A and 261B or consent of instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (Same course as Neuroscience 261C and Molecular, Cellular, and Integrative Physiology 261C.) Not offered every year. (S/U grading only.)—(III.) Werner

263. Modeling in Systems Neuroscience (4)
Lecture—3 hours; lecture/laboratory—1 hour. Prerequisite: consent of instructor. Modeling as a tool in systems neuroscience. Mathematical techniques will be introduced and used to explore advanced topics in echolocation, sound localization, electroreception, communications, and motor systems. Other topics include transforms, modeling assumptions, scales and linearity. Offered in alternate years.

267. Computational Neuroscience (5)
Lecture—4 hours; lecture/laboratory—3 hours. Prerequisite: one course in general neuroscience at the level of course 100; one year college-level Calculus at level of Math 16A, B, C; one year Physics at the level of Physics 7A, B, C, strongly recommended; students from other departments should contact the instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single-neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. Offered in alternate years. (Same course as Neuroscience 267.)—(I.) Goldman

270. How to Write a Fundable Grant Proposal (3)
Lecture/discussion—3 hours. Prerequisite: graduate standing in a life science and consent of instructor. Familiarization with the skills required to craft a successful grant proposal submitted to extramural agencies such as NIH and NSF.

285. Literature in Visual Neuroscience (2)
Seminar—2 hours. Literature in Visual Neuroscience. (Same course as Neuroscience 285.) May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Britten, Ditterich, Goldman, Usrey

287A. Topics in Theoretical Neuroscience (2)
Seminar—2 hours. Prerequisite: consent of instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. Offered in alternate years. May be repeated for credit. (Same course as Neuroscience 287A.) (S/U grading only.)—(I.) Ditterich, Goldman

287B. Topics in Theoretical Neuroscience (2)
Seminar—2 hours. Prerequisite: consent of instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Same Course as Neuroscience 287B.) (S/U grading only.)—III. (III.) Ditterich, Goldman

291. Auditory Neuroscience (1)
Seminar—0.5 hours; discussion—0.5 hours. Prerequisite: course 100 or 112 or Neuroscience 222 or the equivalent. Exploration of various important aspects of auditory physiology, behavior and psychophysics through review of original literature. New topic each quarter. May be repeated for credit with consent of instructor. (S/U grading only.)—I, II, III. (I, II, III.) DeBello, Recanzone, Sutter

Neuroscience

See Neurobiology, Physiology, and Behavior, on page 431; and Neuroscience (A Graduate Group), below.

Neuroscience (A Graduate Group)

Barbara Chapman, Ph.D., Chairperson of the Group

Group Office. 148 Center for Neuroscience
(530) 757-8845;
http://neuroscience.ucdavis.edu/grad

Faculty

Mark Agius, M.D., Professor *(Neurology)*
David Amaral, Ph.D., Professor *(Psychiatry)*
Kathleen Baynes, Ph.D., Professor *(Neurology)*
Robert Berman, Ph.D., Professor *(Neurological Surgery)*
Laura Borodinsky, Ph.D., Assistant Professor *(Physiology and Membrane Biology)*
Kenneth H. Britten, Ph.D., Professor *(Neurobiology, Physiology, and Behavior)*
Marie Burns, Ph.D., Professor *(Ophthalmology and Vision Science)*
Earl E. Carstens, Ph.D., Professor *(Neurobiology, Physiology, and Behavior)*
Cameron Carter, Ph.D., Professor *(Psychology and Behavioral Science)*
Barbara Chapman, Ph.D., Professor *(Neurobiology, Physiology, and Behavior)*
Tsung-Yu Chen, Ph.D., Associate Professor *(Neurology)*
Hwai-Jong Cheng, M.D., Ph.D., Associate Professor *(Neurobiology, Physiology, and Behavior)*
Blythe Corbett, Ph.D., Associate Professor *(Psychiatry and Behavioral Sciences)*
Gino Cortopassi, Ph.D., Professor *(Molecular Biosciences)*
William DeBello, Ph.D., Associate Professor *(Neurobiology, Physiology, and Behavior)*
Charlie DeCarli, Ph.D., Professor *(Neurology)*
Wenbin Deng, Ph.D., Assistant Professor *(Cell Biology and Human Anatomy)*
Elva Diaz, Ph.D., Assistant Professor *(Pharmacology)*
Elizabeth Disbrow, Ph.D., Associate Professor *(Neurology)*
Jochen Ditterich, Ph.D., Assistant Professor *(Neurobiology, Physiology, and Behavior)*
Arne Ekstrom, Ph.D., Assistant Professor *(Psychology)*
Michael Ferns, Ph.D., Associate Professor *(Anesthesiology and Pain Medicine)*
Joy Geng, Ph.D., Assistant Professor *(Psychology)*
Mark Goldman, Assistant Professor *(Neurobiology, Physiology and Behavior)*
Qizhi Gong, Ph.D., Associate Professor *(Medicine: Cell Biology and Human Anatomy)*
Fredric Gorin, M.D., Ph.D., Professor *(Neurology)*
Paul Hagerman, M.D., Ph.D., Professor *(Biochemistry and Molecular Medicine)*
Randi Hagerman, M.D., Professor *(Pediatrics)*
Andrew T. Ishida, Ph.D., Professor *(Neurobiology, Physiology, and Behavior and Ophthalmology)*
Petr Janata, Ph.D., Associate Professor *(Psychology)*
Lee-Way Jin, Ph.D., Associate Professor *(Pathology)*
Paul S. Knoepfler, Ph.D., Assistant Professor *(Cell Biology and Human Anatomy)*
Leah Krubitzer, Ph.D., Professor *(Psychology)*
Janine LaSalle, Ph.D., Professor *(Medical Microbiology and Immunology)*
Pamela Lein, Ph.D., Associate Professor *(Molecular Biosciences)*
Noelle L'Etoile, Ph.D., Assistant Professor *(Psychiatry)*
Steven Luck, Ph.D., Professor *(Psychology)*
Bruce Lyeth, Ph.D., Professor *(Neurological Surgery)*
Richard Maddock, M.D., Professor *(Psychiatry and Behavioral Sciences)*
George (Ron) Mangun, Ph.D., Professor *(Psychology, Neurology)*
Kimberley McAllister, Ph.D., Associate Professor *(Neurology, and Neurobiology, Physiology and Behavior)*
Lee Miller, Ph.D., Assistant Professor *(Neurobiology, Physiology, and Behavior)*
Brian Mulloney, Ph.D., Professor *(Neurobiology, Physiology, and Behavior)*
Liping Nie, Ph.D., Assistant Adjunct Professor *(Otolaryngology)*
Stephen Noctor, Ph.D., Assistant Professor *(Psychiatry and Behavioral Sciences)*
John Olichney, Ph.D., Associate Professor *(Neurology)*
Isaac N. Pessah, Ph.D., Associate Professor *(Molecular Biosciences)*
David Pleasure, M.D., Ph.D., Professor *(Neurology and Pediatrics)*
J. Daniel Ragland, Ph.D., Associate Professor *(Psychiatry and Behavioral Sciences)*
Charan Ranganath, Ph.D., Associate Professor *(Psychology)*
Gregg H. Recanzone, Ph.D., Professor *(Neurobiology, Physiology, and Behavior)*
David Richman, M.D. Professor *(Neurology)*
Susan Rivera, Ph.D., Associate Professor *(Psychology)*
Philip A. Schwartzkroin, Ph.D., Professor *(Neurological Surgery)*
Frank Sharp, M.D., Professor *(Neurology)*
Karen Sigvardt, Ph.D., Adjunct Professor *(Neurology)*
Tony Simon, Ph.D., Associate Professor *(Psychiatry and Behavioral Sciences)*
Mitchell L. Sutter, Ph.D., Professor *(Neurobiology)*
Diane Swick, Ph.D., Associate Adjunct Professor *(Neurology)*
Brian Trainor, Ph.D., Assistant Professor *(Psychology)*
Jim Trimmer, Ph.D., Professor *(Neurobiology, Physiology, and Behavior)*
Martin Usrey, Ph.D., Associate Professor *(Neurobiology, Physiology, and Behavior and Neurology)*
Ana Elena Vazquez, Ph.D., Assistant Adjunct Professor *(Otolaryngology)*
John Werner, Ph.D., Professor *(Ophthalmology and Vision Science, Neurobiology, Physiology and Behavior)*
David Woods, Ph.D., Adjunct Professor *(Neurology)*
Ebenezer Yamoah, Ph.D., Professor *(Otolaryngology)*
Andrew Yonelinas, Ph.D., Professor *(Physiology)*
Chengji Zhou, Ph.D., Assistant Professor *(Cell Biology and Human Anatomy)*
Min Zhao, M.D., Ph.D., Professor *(Dermatology, Ophthalmology)*
Karen Zito, Ph.D., Assistant Professor *(Neurobiology, Physiology, and Behavior)*

Emeriti Faculty

Leo M. Chalupa, Ph.D., Professor *(Neurobiology, Physiology, and Behavior)*
Edward G. Jones, M.D., Ph.D., Professor *(Psychiatry)*

Graduate Study. The Graduate Group in Neuroscience offers programs of study leading to the Ph.D. degree. Neuroscience is a broad, interdepartmental program with faculty interests ranging from molecular biophysics of channels to cortical organization and cognition. A major goal of the program is to prepare students for careers as research scientists.

Details of the program may be obtained from the Group office.

Graduate Advisers. R. Berman *(Neurological Surgery)*, H. Cheng *(Neurobiology, Physiology, and Behavior)*, B. Chapman *(Neurobiology, Physiology, and Behavior)*, A. Ekstrom *(Psychology)*, K. McAllister *(Neurobiology, Physiology, and Behavior)*

Courses in Neuroscience (NSC)

Upper Division Course

160. Molecular and Cellular Neurobiology (3)
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: Neurobiology, Physiology, and Behavior 100, Biological Sciences 101 and consent of instructor. Selected topics in neurobiology. Topics include channel biophysics, action potential propagation, intracellular signal transduction pathways, synaptic physiology and quantal analysis, cellular mechanisms of synaptic plasticity, and neuromodulation of synaptic circuitry. (Same course as Neurobiology, Physiology, and Behavior 160.)—III. (III.) Burns, Mulloney

Graduate Courses

200LA. Laboratory Methods in Neurobiology (6)
Laboratory—18 hours. Prerequisite: graduate standing in the Neuroscience Graduate Group. Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design. May be repeated three times for credit. (S/U grading only.)—I, II, III. (I, II, III.)

200LB. Laboratory Methods in Neurobiology (3)
Laboratory—9 hours. Prerequisite: graduate standing in the Neuroscience Graduate Group. Individual research in the laboratory of a faculty member. Research problems emphasize the use of contemporary methods and good experimental design. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

201. Neuroanatomy (3)
Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: consent of instructor. Mix of lectures, demonstrations, and dissections, emphasizing functional significance of neuroanatomy from a biological perspective, with comparisons between human and non-human brains. Emphasis placed on functional anatomy of the nervous system, integrated with cellular, molecular, cognitive, and developmental concepts. Limited enrollment.—I. (I.) Amaral, Chapman, Jones, Usrey

211. Advanced Topics in Neuroimaging (2)
Seminar—2 hours. Prerequisite: Psychology 210 or consent of instructor. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. Limited enrollment. (Same course as Neurobiology, Physiology and Behavior 211 and Psychology 211.) (S/U grading only.)—II. (II.) Miller

220. How to Give a Scientific Seminar (3)
Lecture/discussion—3 hours. Prerequisite: consent of instructor. Presentation of effective seminars. Student presentations of selected neuroscience topics in seminar format. Must be taken in two consecutive quarters.—II-III. (II-III.) DeBello, McAllister

221. Cellular Neurophysiology (4)
Lecture—4.5 hours. Prerequisite: graduate standing or consent of instructor. Physiological aspects of cellular and subcellular organization of the nervous system. Neuronal cell biology, the structure and function of ion channels, electrical excitability, signaling cascades, sensory transduction and, mechanisms of synaptic transmission, and the cellular basis of learning and memory.—I. (I.) Burns, Chen, Trimmer

222. Systems Neuroscience (5)
Lecture—4 hours; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. Integrative and information-processing aspects of nervous system organization. Topics include sensory systems, motor function, sensorimotor integration, the limbic system, and the neurobiology of learning and memory. (Same course as Neurobiology, Physiology, and Behavior 222.)—II. (II.) Usrey

223. Cognitive Neuroscience (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate student standing in Psychology or Neuroscience or consent of instructor. Graduate core course for neuroscience. Neurobiological bases of higher mental function including attention, memory, language. One of three in three-quarter sequence. (Same course as Psychology 261.)—III. (III.) Swaab

224A. Molecular and Developmental Neurobiology (2)
Lecture/discussion—2 hours. Prerequisite: consent of instructor. Key issues in developmental and molecular neurobiology. Discussion emphasis on critical evaluation of the experiments and methods described in research papers. Readings of seminal, primary research papers, reviews, and book chapters. Reading materials will be distributed one week in advance.—II. (II.) Diaz, L'Etoile

224B. Molecular and Developmental Neurobiology (2)
Lecture/discussion—2 hours. Prerequisite: course 224A or consent of instructor. Continuation of course 224A. Key issues in developmental and molecular neurobiology, focusing on developmental topics. Discussion emphasis on critical evaluation of experiments and methods described in associated literature.—III. Chapman, Cheng

225. Translational Research in the Neurobiology of Disease (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: Past or concurrent enrollment in Neuroscience courses 221, 222, 223, or permission of instructor; restricted to current graduate student enrollment or permission of instructor. This course will provide an overview of major neuropsychiatric and neurological disorders from both the clinical and fundamental science perspectives. Offered in alternate years.—II. Carter, Jones, Schwartzkroin

226. Molecular and Developmental Neurobiology (4)
Lecture/discussion—4 hours. Prerequisite: consent of instructor. Introduction to molecular and developmental neurobiology. Topics range from neurulation to development of sensory systems and include modern molecular methods and their application in developmental neuroscience.—II. (II.) McAllister, L'Etoile

243. Topics in Cellular and Behavioral Neurobiology (2)
Discussion—1 hour; seminar—1 hour. Prerequisite: consent of instructor. An advanced examination of several current problems in neurobiology. Topics will vary in different years; may be repeated for credit. (S/U grading only.)—III. (III.) Ishida

247. Topics in Functional Neurogenomics (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing or consent of instructor. The theory, methods and principles of functional neurogenomics with emphasis on the relationship to molecular mechanisms involved in development and disease of the nervous system. (Same course as Neurobiology, Physiology, and Behavior 247.)—II. Choudary

250. Biology of Neuroglia (2)
Lecture/discussion—1.5 hours. Prerequisite: consent of instructor. The properties and functions of non-neuronal or neuroglial cells in the mammalian central nervous system with relevance to neuronal development, physiology and injury response. Offered in alternate years. (Same course as Cell Biology and Human Anatomy 250.) (S/U grading only.)—III.

261A. Topics in Vision: Eyes and Retinal Mechanisms (2)
Lecture/discussion—2 hours. Prerequisite: graduate standing, Neurobiology, Physiology, and Behavior 100 or 112 or the equivalent. Structure and function of the visual system, with emphasis on the eye and retina, including optics, anatomy, transduction, retinal synapses, adaptation, and parallel processing. (Same course as Neurobiology, Physiology, and Behavior 261A and Molecular, Cellular, and Integrative Physiology 261A.) (S/U grading only.)—II. (II.) Ishida

261B. Topics in Vision: Systems, Psychophysics, Computational Models (2)
Lecture/discussion—2 hours. Prerequisite: consent of instructor, course 261A recommended. Functions of the central visual pathways and their underlying mechanisms. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system. (Same course as Neurobiology, Physiology, and Behavior 261B and Molecular, Cellular, and Integrative Physiology 261B.) (S/U grading only.) Offered in alternate years.—II. Britten

261C. Topics in Vision: Clinical Vision Science (2)
Lecture/discussion—2 hours. Prerequisite: courses 261A and 261B, or consent of instructor. Causes and mechanistic bases of major blinding diseases. Recent research on aspects of anatomy, biochemistry, electrophysiology, psychophysics, development, and genetics of the visual system related to disease. (Same course as Neurobiology, Physiology, and Behavior 261C and Molecular, Cellular, and Integrative Physiology 261C.) (S/U grading only.) Not offered every year.—III. Werner

267. Computational Neuroscience (5)
Lecture—4 hours; lecture/laboratory—3 hours. Prerequisite: one course in general neuroscience at the level of course 100; one year college-level Calculus at level of Math 16A, B, C; one year Physics at the level of Physics 7A, B, C, strongly recommended; students from other departments should contact the instructor. Mathematical models and data analysis techniques used to describe computations performed by nervous systems. Lecture topics include single-neuron biophysics, neural coding, network dynamics, memory, plasticity, and learning. Lab topics include programming mathematical models and data analysis techniques in MATLAB. Offered in alternate years. (Same course as Neurobiology, Physiology & Behavior 267.)—(I.) Goldman

283. Neurobiological Literature (1)
Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in neurobiology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Mulloney, Wilson

284. Development of Sensory Systems (1)
Seminar—1 hour. Prerequisite: consent of instructor. Presentation and discussion of recent literature on the development of sensory systems. May be repeated for credit. (S/U grading only.)—II, III. (II, III.) Chapman

285. Literature in Visual Neuroscience (2)
Seminar—2 hours. Critical presentation and discussion of current literature in visual neuroscience. (Same course as Neurobiology, Physiology, and Behavior 285.) May be repeated for credit if topic differs. (S/U grading only.)—I, II, III. (I, II, III.) Usrey, Britten

287A. Topics in Theoretical Neuroscience (2)
Seminar—2 hours. Prerequisite: consent of instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit. (Same course as Neurobiology, Physiology & Behavior 287A.) (S/U grading only.)—(I.) Ditterich, Goldman

287B. Topics in Theoretical Neuroscience (2)
Seminar—2 hours. Prerequisite: consent of instructor. In-depth exploration of topics in theoretical neuroscience. Topic varies each year. Fall quarter (287A): foundational material from books and review articles. Spring quarter (287B): continuation of year's topic through readings of seminal articles from the primary literature. May be repeated for credit.

(Same Course as Neurobiology, Physiology & Behavior 287B.) (S/U grading only.)—III. (III.) Ditterich, Goldman

289. Topics in Molecular and Developmental Neurobiology (1)
Seminar—2 hours. Analysis and discussion of seminal and current research papers in molecular and developmental neurobiology. Different topics will be covered each quarter. In the past topics have included, "Synaptic vesicle dynamics," "Neuronal polarity," and "Glutamate receptors." May be repeated ten times for credit when topic differs. (S/U grading only.)—II, III. (II, III.) Diaz, McAllister, Zito

290C. Research Conference in Neurobiology (1)
Discussion—1 hour. Prerequisite: graduate standing in Neuroscience or consent of instructor; course 299 (concurrently). Presentation and discussion of faculty and graduate student research in neurobiology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

292. Cortical Plasticity and Perception (2)
Lecture/discussion—2 hours. Prerequisite: Neurobiology, Physiology, and Behavior 100 or 112 or equivalent or consent of instructor. Examination of research articles on cortical plasticity and changes in perception. Examples drawn from studies of the somatosensory, visual, auditory, and motor cortex. (Same course as Neurobiology, Physiology, and Behavior 292.) Offered in alternate years. (S/U grading only.)—(II.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Neurology

See Medicine, School of, on page 380.

Neurosurgery

See Medicine, School of, on page 380.

Nursing, School of, Betty Irene Moore

Heather M. Young, Ph.D., R.N., F.A.A.N.; Associate Vice Chancellor for Nursing, UC Davis Health System; Dean, Betty Irene Moore School of Nursing

Deborah Ward, Ph.D., R.N., F.A.A.N., Associate Dean

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Mission Statement

The Betty Irene Moore School of Nursing at UC Davis cultivates academic excellence through immersive, interprofessional and interdisciplinary education and research in partnership with the communities serves. Faculty, staff and students discover and disseminate knowledge to advance health, improve quality of care and shape policy.

Nursing Science and Health-Care Leadership Graduate Degree Program

Hosted by the Betty Irene Moore School of Nursing at UC Davis, the Nursing Science and Health-Care Leadership Graduate Degree Program opens to the inaugural classes of doctoral and master's degree students in fall 2010. The UC Davis Nursing Science and Health-Care Leadership Graduate Degree Program prepares nurse leaders, researchers and faculty in a unique interdisciplinary and interprofessional environment. The graduate group is composed of faculty from across campus with expertise in nursing, medicine, health informatics, nutrition, biostatistics, public health and other fields. The doctoral program, an academic program, prepares graduates as health-care and health policy leaders and nurse faculty/researchers at the university level. Graduates of the professional master's degree program will be well prepared for health-care leadership roles in a variety of organizations and as nurse faculty at the community college and prelicensure education levels.

Faculty

Paul FitzGerald, Ph.D., Graduate Group Chair, Professor, Acting Chair *(Cell Biology and Human Anatomy)*
Lars Berglund, M.D., Ph.D., Associate Dean for Research, Professor of Medicine; Director, UC Davis Clinical and Translational Science Center
Timothy W. Cutler, Pharm. D., Assistant Clinical Professor *(Clinical Pharmacy)*; School of Pharmacy, UC San Francisco; UC Davis Director, Sacramento Experimental Pharmacy Program
Christiana Drake, Ph.D., Chair *(Biostatistics Graduate Group)*; Professor *(Statistics)*
Suzanne Eidson-Ton, M.D., M.S., Assistant Clinical Professor *(Family and Community Medicine; OB/GYN)*
Scott Fishman, M.D., Professor, Chief of Pain Medicine *(Anesthesiology and Pain Medicine)*
Ellen Gold, Ph.D. Professor, Chair *(Public Health Sciences)*
Donald M. Hilty, M.D., Professor of Clinical Psychiatry *(Psychiatry and Behavioral Sciences)*
Ladson Hinton, M.D., Professor *(Psychiatry and Behavioral Sciences)*; Director, Education Core, UC Davis Alzheimer's Disease Center
Calvin Hirsch, M.D., Professor *(Internal Medicine, Geriatric Medicine)*
Karnjit Johl, M.D., Assistant Professor *(Internal Medicine)*
Richard L. Kravitz, M.D., M.S.P.H., Professor, Co-Vice Chair *(General Medicine)*
Frederick J. Meyers, M.D., Executive Associate Dean, School of Medicine; Professor *(Internal Medicine)*; Medical Director, Home Health Services
Richard Michelmore, Ph.D., Director, Genome Center and Bioinformatics Program *(Medical Microbiology and Immunology)*; Professor *(Plant Sciences)*; Professor *(Molecular and Cellular Biology)*
Elizabeth Miller, M.D., Ph.D. Assistant Professor *(Pediatrics)*
Thomas S. Nesbitt, M.D., M.P.H., Associate Vice Chancellor for Strategic Technologies and Alliances; Professor *(Family and Community Medicine)*
Debora Paterniti, Ph.D., Associate Adjunct Professor *(Internal Medicine, Sociology, Center for Healthcare Policy and Research)*
Anthony Philipps, M.D., Professor, Chair *(Pediatrics)*
Patrick S. Romano, M.D., Professor *(Internal Medicine, General Medicine, Pediatrics)*
Elena Siegel, Ph.D., R.N., Assistant Professor
Andreea Seritan, M.D., Assistant Professor *(Psychiatry and Behavioral Medicine)*
Ulfat Shaikh, M.D., M.P.H., M.S., Assistant Professor *(Pediatrics)*
Hendry Ton, M.D., M.S.P.H., Health Sciences Associate Clinical Professor *(Psychiatry, Behavioral Sciences)*
Marlene M. von Friederichs-Fitzwater, Ph.D., M.P.H., Adjunct Assistant Professor *(Hematology, Oncology)*; Director, Outreach Research and Education Program, UC Davis Cancer Center
Deborah Ward, Ph.D., R.N., Associate Dean, Associate Clinical Professor *(Health Sciences)*
Peter Yellowlees, M.B.B.S., M.D., Director, Health Informatics; Professor *(Psychiatry, Behavioral Sciences)*
Heather M. Young, Ph.D., R.N., Associate Vice Chancellor, Nursing; Dean, Professor in Residence
Sheri Zidenberg-Cherr, Ph.D., Specialist, Cooperative Extension Specialist *(Nutrition)*

Courses in Nursing (NRS)

Graduate Courses

201. Health Status and Care Systems (4)
Lecture/discussion—3 hours; laboratory/discussion; project. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Comparative health status data, major current health issues globally, nationally, regionally. Theoretical perspectives on social, political, economic determinants of health. Health-care systems examined, linked to data, and evaluated in re outcomes. Aging, rural, ethnic minority populations highlighted.—I. (I.)

202. Implementation Science (4)
Lecture/discussion—4 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Change processes in health care from political, historic, economic and sociologic frameworks. Historic and current examples of transformative change in the health care system. Skills for system transformation through health policy, practice, research and education are emphasized.—II. (II.)

203. Leadership in Health Care (4)
Lecture/discussion—3 hours; fieldwork. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Critical examination of leadership from a variety of theoretical and philosophical perspectives and focuses on specific challenges in health care and leadership at various levels, e.g., patient, organizational, and policy levels.—III. (III.)

204. Quantitative Skills for Change (4)
Lecture/discussion—3 hours; laboratory/discussion—1 hour. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Foundation for analyzing research, health, and systems data to answer clinical, systems, or policy questions. Use and examine multiple sources of data and information as a basis for planned change and transformation in health care.—III. (III.)

205. Research Design in Nursing and Health (4)
Lecture/discussion—4 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Major types of quantitative and qualitative research design and their application to nursing and health care research. Implications of choosing alternative research designs and critical analysis of philosophical underpinnings. Evaluation of control and validity, sampling, instruments to measure health concepts.—III. (III.)

206. Community Connections (2-5)
Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only. Community-based learning and experiences including community participation, assessment, data collection and analysis using multiple approaches, community health improvement projects, collaborative leadership practice, all with the guidance of community members and nursing faculty. (S/U grading only.)—I, II, III. (I, II, III.)

290. Master's Seminar (2)
Discussion—2 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Open to NSHL MS students only or by consent of course instructor of record. Subject varies from quarter to quarter. Current knowledge and issues relevant to one of two fields of emphasis: population health or health systems. May be repeated 10 times for credit.—I, II, III. (I, II, III.)

291. Doctoral Seminar (2)
Discussion—2 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Focus on the theory, research and knowledge relevant to one of two fields of emphasis: population health or health systems. Emphasis placed on reading, critique and synthesis of classic and cutting-edge research in nursing and health care. May be repeated 10 times for credit.—I, II, III. (I, II, III.)

Professional Courses

301. Methods for Teaching Nursing and Health Sciences: Use of Simulation (4)
Lecture/discussion—4 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Simulation education reviewed as a teaching tool in nursing and health sciences; explores how to integrate simulation into individual courses. Emphasis placed on simulations that include clinical judgment, teamwork, and interdisciplinary communication. Offered in alternate years.—I.

302. Methods for Teaching Nursing and Health Sciences: Curriculum and Instruction (4)
Lecture/discussion—4 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Best practices in adult learning, performance-based curriculum models and instructional design. Experience in planning student-centered learning activities that are engaging and effective in achieving desired student performance. Use of distance technologies, case-based teaching, clinical teaching, role of clinical teacher. Offered in alternate years.—II.

303. Methods for Teaching Nursing and Health Sciences: Assessment/Evaluation of Learning (4)
Lecture/discussion—4 hours. Prerequisite: current enrollment in the Nursing Science and Health-Care Leadership graduate program or consent of instructor. Application of approaches, processes, and tools for assessing adult learning, especially those that assess the student's ability to use knowledge/skills in practical situations. Other topics include: design of performance evaluation tasks, instructional rubrics, use of portfolios, grading, and reporting. Offered in alternate years.—(III.)

Nutrition

See Clinical Nutrition, on page 195; Food Service Management, on page 307; Nutrition; Nutritional Biology (A Graduate Group), on page 443; Nutrition Science, on page 444.

Nutrition

(College of Agricultural and Environmental Sciences)

Francene M. Steinberg, Ph.D., RD., Chair of the Department

Department Office. 3135 Meyer Hall (530) 752-4630; *http://nutrition.ucdavis.edu*

Faculty

Elizabeth Applegate, Ph.D., Senior Lecturer *(SOE) Academic Senate Distinguished Teaching Award*
Kenneth H. Brown, M.D., Professor
Gary Cherr, Ph.D., Professor *(Nutrition, Environmental Toxicology)*
Andrew J. Clifford, Ph.D., Professor
Kathryn G. Dewey, Ph.D., Professor
Nilesh W. Gaikwad, Ph.D., Assistant Professor *(Nutrition, Environmental Toxicology)*
Fawaz G. Haj, Ph.D., Assistant Professor
Carl L. Keen, Ph.D., Distinguished Professor *(Nutrition, Internal Medicine)*
Bo L. Lönnerdal, Ph.D., Distinguished Professor *(Nutrition, Internal Medicine)*
Roger McDonald, Ph.D., Professor
Patricia Oteiza, Ph.D., Associate Professor
Carolyn M. Slupsky, Ph.D., Assistant Professor *(Nutrition, Food Science & Technology)*
Francene M. Steinberg, Ph.D., R.D., Associate Professor
Judith S. Stern, Sc.D., R.D., Distinguished Professor *(Nutrition, Internal Medicine)*
Christine Stewart, Ph.D., Assistant Professor *(Nutrition)*

Emeriti Faculty

Lindsay H. Allen, Ph.D., Professor Emeritus
Louis E. Grivetti, Ph.D., Professor Emeritus
Janet King, Ph.D., Professor Emeritus
Robert B. Rucker, Ph.D., Professor Emeritus
Barbara O. Schneeman, Ph.D., Professor Emeritus
Frances J. Zeman, Ph.D., Professor Emeritus

Affiliated Faculty

Sean Adams, Ph.D., Assistant Adjunct Professor
Ellen Bonnel, Ph.D., Academic Administrator
Betty Burri, Ph.D., Adjunct Professor
Britt Burton-Freeman, Ph.D., Assistant Research Nutritionist
Paul A. Davis, Ph.D., Research Nutritionist
Cesar Fraga, Ph.D., Research Chemist
Ellen Fung, Ph.D., RD Associate Adjunct Professor
Heidrun Gross, Ph.D., Assistant Project Scientist
Robert M. Hackman, Ph.D., Research Nutritionist
Lynn Hanna, Ph.D., Assistant Project Scientist
Marjorie Haskell, Ph.D., Associate Researcher
Peter Havel, Ph.D., D.V.M., Researcher
Wayne Hawkes, Ph.D., Assistant Adjunct Professor
M. Jane Heinig, Ph.D., Academic Administrator
Sonja Hess, Ph.D., Assistant Project Scientist
Liping Huang, Ph.D., Associate Adjunct Professor
Nancy Hudson, M.S., RD, Academic Coordinator/ Lecturer
Daniel Hwang, Ph.D., Adjunct Professor
Lucia Kaiser, Ph.D., R.D., Associate Specialist in Cooperative Extension
Nancy Keim, Ph.D., Adjunct Professor
Darshan Kelley, Ph.D., Adjunct Professor
Kevin Laugero, Ph.D., Assistant Adjunct Professor
Louise Lanoue, Ph.D., Associate Project Scientist
John Newman, Ph.D., Assistant Adjunct Professor
Gertrud Schuster, Ph.D., Assistant Project Scientist
Charles Stephensen, Ph.D., Adjunct Professor
Barbara Sutherland, Ph.D., Academic Administrator
Marilyn S. Townsend, Ph.D., R.D., Specialist in Cooperative Extension
Janet Uriu-Adams, Ph.D., Associate Researcher
Marta Van Loan, Ph.D., Adjunct Professor
Sheri Zidenberg-Cherr, Ph.D., Specialist in Cooperative Extension
Susan Zunino, Ph.D., Associate Adjunct Professor

Major Programs. See the majors in Clinical Nutrition, on page 195 and Nutrition Science, on page 444.

Minor Program Requirements:

The Department of Nutrition offers four minor programs open to students majoring in other disciplines who wish to complement their study programs with a concentration in the area of food and nutrition.

Note: If the student's major program requires the same course in biochemistry and physiology, only one of the courses may duplicate credit toward the minor. Each program below lists replacement courses to fulfill the minimum unit requirement.

Community Nutrition ..... 20 UNITS

Preparation. plan in advance to include the required course prerequisites.
Nutrition 111AV and 111B 5
Nutrition 118, 192 (2 units) 6
Nutrition 120AN or 120BN 4
Neurobiology, Physiology, and Behavior 101 5
Replacement courses; see note above: Nutrition 114, 116A-116B, 116AL-116BL.

Food Service Management ..... 25 UNITS

Preparation. Plan in advance to include the required course prerequisites.
Food Science and Technology 100A-100B, 101A-101B and 108 13
Food Service Management 120, 120L, 122 8
Agricultural and Resource Economics 112 4
Replacement courses; see note above: Nutrition 10, 111AV, 111B, 114, 116A-116B, 120AN, or 120BN, Economics 1A-1B.

Nutrition and Food ..... 22 UNITS

Preparation. Plan in advance to include the required course prerequisites.
Nutrition 111AV and 111B 5
Nutrition 120AN or 120BN 4
Food Science and Technology 100A, 100B 8
Neurobiology, Physiology, and Behavior 101 5
Replacement courses; see note above: Nutrition 114, 116A-116B, 116AL-116BL.

Nutrition Science ..... 20 UNITS

Preparation. Plan in advance to include the required course prerequisites.
Animal Biology 102 and 103, Biological Sciences 102 and 103 and Nutrition 111AV and 111B 11-15
Neurobiology, Physiology, and Behavior 101 5
Replacement courses; see note above: Nutrition 114, 115, 116A-116B, 117, 120AN or 120BN, 122, 123, 124, 201, 204.

Minor Adviser. 3211 Meyer Hall (530) 752-2512

Graduate Study. Programs of study leading to the M.S. and Ph.D. degrees are available in Nutrition. For information on graduate study contact the Nutrition Graduate Group.

Courses in Nutrition (NUT)

Lower Division Courses

10. Discoveries and Concepts in Nutrition (3)
Lecture—3 hours. Nutrition as a science; historical development of nutrition concepts; properties of nutrients and foods. Not open for credit to students who have taken an upper division course in nutrition. GE credit: SciEng.—I, II, III. (I, II, III.) Applegate

11. Current Topics and Controversies in Nutrition (2)
Discussion—1.5 hours; term paper. Exploration of current applications and controversies in nutrition. Students read scientific journal articles and write

summaries, as well as give brief oral presentations. Topics change to reflect current interests and issues. GE credit: SciEng, Wrt.—I, II, III. (I, II, III.) Applegate

99. Individual Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

104. Environmental & Nutritional Factors in Cellular Regulation and Nutritional Toxicants (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 101; Biological Sciences 103 or Animal Biology 103. Cellular regulation from nutritional/toxicological perspective. Emphasis: role of biofactors on modulation of signal transduction pathways, role of specific organelles in organization/regulation of metabolic transformations, major cofactor functions, principles of pharmacology/toxicology important to understanding nutrient/toxicant metabolism. (Same course as Environmental Toxicology 104.)—I. (I.) Oteiza

105. Nutrition and Aging (3)

Lecture—3 hours. Prerequisite: course 111AV and Animal Biology 103 or the equivalent. Role of nutrition in the aging process from both an organismal/cell perspective, including demographics, theories of aging, nutrition and evolution, nutritional manipulation and life-span extension, and nutrition's impact on the diseases of aging.—III. (III.) McDonald

111AV. Introduction to Nutrition and Metabolism (3)

Web virtual lecture—3 hours. Prerequisite: Chemistry 8B, Neurobiology, Physiology, and Behavior 101 or the equivalent. Introduction to metabolism of protein, fat and carbohydrate; the biological role of vitamins and minerals; nutrient requirements during the life cycle; assessment of dietary intake and nutritional status. Not open for credit to students who have completed course 101.—III. (III.) McDonald

111B. Recommendations and Standards for Human Nutrition (2)

Lecture—2 hours. Prerequisite: Chemistry 8B, Neurobiology, Physiology, and Behavior 101 or the equivalent. Critical analysis of the development of nutritional recommendations for humans. Topics include history of modern recommendations, development of the Recommended Dietary Allowance (RDA) and other food guides; the Dietary Reference Intakes (DRI); administrative structure of regulatory agencies pertinent to nutrition recommendations; introduction to scientific methods used to determine the recommendations; food labeling laws; nutrition recommendations in other countries and cultures. Not open for credit to students who have completed course 111.—III. (III.)

112. Nutritional Assessment: Dietary, Anthropometric, and Clinical Measures (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Animal Biology 102 and 103 or course 101, course 111 (may be taken concurrently), Statistics 13. Methods of human nutritional assessment, including dietary, anthropometric, biochemical and hematological techniques, and physical examination. Principles of precision, accuracy, and interpretation of results for individuals and populations.—III. (III.)

114. Developmental Nutrition (4)

Lecture—4 hours. Prerequisite: Animal Biology 102 and 103 or course 101; course 111. Role of nutritional factors in embryonic and postnatal development. GE credit: SciEng, Wrt.—II. (II.) Keen

115. Animal Feeds and Nutrition (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B, Animal Science 41. Analyses and evaluation of feeds, influences of production, processing and storage methods on nutritive value of feeds. Animal nutrition. Diet formulation. GE credit: SciEng, Wrt.—II. (II.) DePeters

116A-116B. Clinical Nutrition (3-3)

Lecture—3 hours. Prerequisite: courses 111, 112 and Neurobiology, Physiology, and Behavior 101 or the equivalent. Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions.—I-II. (I-II.) Steinberg, Stern, Clifford

116AL. Clinical Nutrition Practicum (3)

Lecture—1 hour; laboratory—3 hours; discussion—1 hour. Prerequisite: course 116A (may be taken concurrently). Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116A.—I. (I.) Hudson

116BL. Clinical Nutrition Practicum (3)

Lecture—1 hour; laboratory—3 hours; discussion—1 hour. Prerequisite: courses 116AL, and 116B (may be taken concurrently). Fundamental principles of planning and evaluating therapeutic diets and patient education for pathological conditions covered in 116B. Continuation of course 116AL.—II. (II.) Steinberg

117. Experimental Nutrition (6)

Lecture—3 hours; laboratory—6 hours; extensive writing. Prerequisite: courses 111, Biological Sciences 102 and 103, and a laboratory course in nutrition or biochemistry. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition. GE credit: Wrt.—I. (I.) Clifford

118. Community Nutrition (4)

Lecture—4 hours. Prerequisite: course 101 or 111, and 116A. Nutrition problems in contemporary communities and of selected target groups in the United States and in developing countries. Nutrition programs and policy, principles of nutrition education.—II. (II.) Dewey

119A. International Community-Based Nutritional Assessment (1)

Lecture/discussion—1 hour. Prerequisite: course 112 (may be taken concurrently) and consent of instructor. Issues and problems related to community-based nutritional assessment in a low-income country, major nutritional problems in low-income countries; ethical issues in human investigation; survey design, data collection techniques, and data analysis; preparation for international travel; cross-cultural communication, health, and safety while living abroad.

119B. International Community-Based Nutritional Assessment (6)

Lecture—2 hours; fieldwork—12 hours. Prerequisite: course 119A and consent of instructor. A six-week summer course in Peru. Implementation of a community-based nutritional assessment survey, including development of the survey instrument, selection of the study sample, collection and verification of data, and analysis and interpretation of the results; the project will be carried out by paired participation of students and faculty members of UC Davis and the collaborating foreign institution.

120AN. Nutritional Anthropology (4)

Lecture—3 hours, discussion—1 hour. Prerequisite: course 2 or Geography 2 recommended. Nutritional anthropology from historical and contemporary perspectives; the anthropological approach to food and diet; field work methods; case histories that explore food patterns and their nutritional implications. GE Credit: Div, SciEng or SocSci.—IV. (IV.)

120BN. Nutritional Geography (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: Geography 2 recommended. Nutritional geography from historical and contemporary perspectives; the geographical approach to food and diet; cultural and environmental factors that influence dietary practices; food-related landscapes and patterns. GE Credit: Div, SciEng or SocSci.

122. Ruminant Nutrition and Digestive Physiology (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division standing; Animal Biology 103 or consent of instructor; Neurobiology, Physiology, and Behavior 101, Biological Sciences 1C, and Mathematics 16B recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in ruminants, both domestic and wild. Laboratories include comparative anatomy, feed evaluation, digestion kinetics using fistulated cows, computer modeling, and microbial exercises.—III. (III.) Fadel

123. Comparative Animal Nutrition (3)

Lecture—3 hours. Prerequisite: Animal Biology 103. Restricted to upper division or graduate students. Comparative nutrition of animals; including laboratory, companion, zoo, and wild animals. Digestion and metabolic adaptations required for animal species to consume diverse diets ranging from grasses and leaves to nectar to insects and meat. Relation of nutrition to metabolic adaptations and physiological states, including growth, reproduction, and diseases.—III. (III.) Klasing

123L. Comparative Animal Nutrition Laboratory (1)

Laboratory—3 hours. Prerequisite: Animal Biology 103, course 123 (may be taken concurrently). Laboratory exercises leading to written reports on establishment of nutritional requirements and formulation of complete diets for laboratory, companion, zoo and wild animals.—III. (III.) Klasing

124. Nutrition and Feeding of Finfishes (3)

Lecture—3 hours. Prerequisite: Biological Sciences 103 and Wildlife, Fish, and Conservation Biology 121. Principles of nutrition and feeding of fishes under commercial situations; implication of fish nutrition to the environment and conservation of endangered species.—I. (I.) Hung

127. Environmental Stress and Development in Marine Organisms (10)

Lecture—4 hours; laboratory—12 hours; discussion—2 hours. Prerequisite: Environmental Toxicology 101 or Biological Sciences 102 or 104 or the equivalent; Environmental Toxicology 114A or course 114 recommended. Course taught at Bodega Marine Laboratory. Effects of environmental and nutritional stress, including pollutants, on development and function in embryos and larvae of marine organisms. Emphasis on advanced experimental methods. (Same course as Environmental Toxicology 127.) GE credit: SciEng.—IV. (IV.) Cherr

129. Journalistic Practicum in Nutrition (3)

Lecture—2 hours; discussion—1 hour. Prerequisite: course 111; a course in written or oral expression or consent of instructor. Critical analysis and discussion of current, controversial issues in nutrition; the use of journalistic techniques to interpret scientific findings for the lay public. Students will be required to write several articles for campus media. Course may be repeated one time for credit.—III. (III.) Stern

130. Experiments in Nutrition: Design and Execution (2)

Laboratory—6 hours. Prerequisite: consent of instructor; course 101, 110, 111, or 114 recommended. Experiments in current nutritional problems. Experimental design: students choose project and, independently or in groups of two-three, design a protocol, complete the project, and report findings. May be repeated for credit up to six times (three times per instructor) with consent of instructor.—I, II, III, IV. (I, II, III, IV.)

190. Proseminar in Nutrition (1)

Seminar—1 hour. Prerequisite: senior standing; course 111. Discussion of human nutrition problems. Each term will involve a different emphasis among experimental, clinical, and dietetic problems of community, national and international scope. May be repeated two times for credit with consent of instructor.—I, II, III. (I, II, III.) Zidenberg-Cherr

190C. Nutrition Research Conference (1)

Discussion—1 hour. Prerequisite: upper division standing in Nutrition or related biological science; consent of instructor. Introduction to research findings and methods in nutrition. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: one upper division course in nutrition and consent of instructor. Work experience on or off campus in practical application of nutrition, supervised by a faculty member. (P/NP grading only.)

197T. Tutoring in Nutrition (1-2)
Discussion/laboratory—3 or 6 hours. Prerequisite: Nutrition Science, Clinical Nutrition or related major. Completion of course 101. Tutoring of students in nutrition courses, assistance with discussion groups or laboratory sections, weekly conference with instructor in charge of course: written evaluations. May be repeated if tutoring a different course. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

201. Vitamin and Cofactor Metabolism (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division nutritional biochemistry and physiology course. Review of studies and relationships involving the metabolic functions of vitamins. Comparative nutritional aspects and the metabolism and chemistry of vitamins and vitamin-like compounds.—III. (III.) Steinberg

202. Advanced Nutritional Energetics (2)
Lecture—2 hours. Prerequisite: Animal Biology 102, 103, Neurobiology, Physiology, and Behavior 101 or the equivalent. History of nutritional energetics. Evaluation of energy transformations associated with food utilization. Energy expenditures at cellular, tissue, and animal levels as affected by diet and physiological state. Current and future feeding systems.—III. (III.) Sainz

203. Advanced Protein and Amino Acid Nutrition (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: one upper division nutritional biochemistry and physiology course. Nutritional significance of protein and amino acids, including studies of the influence of dietary protein on digestion, absorption, metabolism, resistance to disease, and food intake. Study of dietary requirements and interrelationships among amino acids.—III. (III.)

204. Mineral Metabolism (2)
Lecture—2 hours. Prerequisite: upper division nutrition or biochemistry course. Studies of metabolic functions and nutritional interrelationships involving minerals.—II. (II.) Lönnerdal, Keen

219A. International Nutrition (3)
Lecture—3 hours. Prerequisite: graduate standing; undergraduates only admitted with consent of instructor after completion of course 111AV. Epidemiology, etiology, and consequences of undernutrition, with particular focus on the nutritional problems of children and women in low income populations. Offered in alternate years.—II. Dewey

219B. International Nutrition (3)
Lecture—3 hours. Prerequisite: course 219A. Intervention programs to prevent or ameliorate nutritional problems in low-income populations. Planning, implementing, and evaluating nutrition intervention programs. Offered in alternate years.—III. Dewey

230. Experiments in Nutrition: Design and Execution (2)
Laboratory—6 hours. Prerequisite: consent of instructor; courses 201, 202, 203, 204, or the equivalent recommended. Student selected projects to enhance laboratory skills. Independently, or in groups of two-three students, design a protocol, carry out the project, analyze the results and report the findings. May be repeated for credit up to six times (limit of three times per instructor) with consent of instructor.—I, II, III. (I, II, III.)

250. Metabolic Homeostasis (3)
Lecture—2 hours; discussion—1.5 hours. Prerequisite: passing the Nutrition Graduate Group Preliminary Examination or consent of instructor. Preference given to students with advanced standing in the Nutrition Graduate Group. Regulatory mechanisms of carbohydrate, lipid, and protein homeostasis; mechanisms of metabolic enzyme regulation and of the metabolic hormones; homeostatic mechanisms and interactions; fuel-fuel interactions; nutrition energy balance.

251. Nutrition and Immunity (2)
Lecture/discussion—2 hours. Prerequisite: Pathology, Microbiology, and Immunology 126, Medical Microbiology 107 or the equivalent, Animal Biology 102. Cellular and molecular mechanisms underlying interactions of nutrition and immune function, including modulation of immunocompetence by diet and effects of immune responses on nutritional needs. Lectures and discussion explore implications for resistance to infection, autoimmunity and cancer. Offered in alternate years.—(II.) Klasing, Erickson, Stephensen

252. Nutrition and Development (3)
Lecture—3 hours. Prerequisite: courses 201, 202, 203, 204. Relationship of nutrition to prenatal and early postnatal development.—II. (II.) Keen

253. Control of Food Intake (3)
Lecture—2 hours; discussion—1 hour; 2 or 3 laboratory demonstrations per quarter. Prerequisite: course 201 or 202 or consent of instructor. Comprehensive study of the biochemical, nutritional, behavioral, and physiological mechanisms controlling food intake. Subject matter will be approached through lectures, laboratory demonstration and discussions where students and staff will critically evaluate the literature. Offered in alternate years.

254. Applications of Systems Analysis in Nutrition (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 202, Physiological Sciences 205A-205B or the equivalent. Quantitative aspects of digestion and metabolism; principles of systems analysis. Evolution of models of energy metabolism as applied in current feeding systems. Critical evaluations of mechanistic models used analytically in support of nutritional research. Offered in alternate years.—II. Fadel

257. Selected Topics in Nutritional and Hormonal Control of Nitrogen Metabolism (2)
Lecture—2 hours. Prerequisite: courses 201 through 204; Physiological Sciences 205A-205B or the equivalent. Quantitative and qualitative aspects of nitrogen metabolism; critical evaluation of dietary intake, hormones and diet-hormone interactions which affect nitrogen metabolism, including protein synthesis-degradation, amino acid synthesis-catabolism, nitrogen transport-excretion, depending on current literature. Offered in alternate years.—(I.) Klasing, Calvert

258. Field Research Methods in International Nutrition (3)
Lecture/discussion—3 hours. Prerequisite: graduate standing or consent of instructor. Issues and problems related to implementation of nutrition field research in less-developed countries, including ethics; relationships with local governments, communities, and scientists; data collection techniques and quality assurance; field logistics; research budgets; and other administrative and personal issues. Offered in alternate years.—(II.) Brown, Dewey,

259. Nutrition and Aging (2)
Lecture—2 hours. Prerequisite: three of courses 201, 202, 203 and 204. Interaction between nutrition and aging. Topics include physiological/biochemical basis of aging, age-related changes affecting nutritional requirements, nutrition and mortality rate, assessment of nutritional status in the elderly, and relationship between developmental nutrition and the rate of aging. Offered in alternate years.

260. Nutrition During Pregnancy (6)
Lecture—5 hours; term paper. Prerequisite: acceptance into the Master's Degree program of Advanced Studies in Maternal and Child Nutrition. Overview of the anatomical, physiological and biochemical changes that occur during pregnancy and early development. Discussion and evaluation of nutritional/lifestyle factors associated with pregnancy outcomes and nutrition programs/interventions for pregnant women.—(I.) Heinig

261. Lactation and Infant Nutrition (6)
Lecture—5 hours; discussion—1 hour. Prerequisite: course 260. Overview of the physiological and biochemical processes underlying human lactation and nutritional needs of both mother and infant. Development of skills in assessment, nutrition counseling, education and support of new mothers and their families.—II. (II.) Heinig

262. Child and Adolescent Nutrition (6)
Lecture—5 hours; discussion—1 hour. Prerequisite: course 261. Relationships among nutrition, growth, and development during childhood and adolescence. Nutritional assessment for normal and high risk groups; psychological, social, and economic factors contributing to nutritional status. Nutritional needs and interventions for special groups, including obese children/adolescents, athletes, and eating disordered.—(III.) Heinig

263. Applied Research Methods in Maternal and Child Nutrition (4)
Lecture—3 hours; term paper. Prerequisite: graduate standing; restricted to students enrolled in the MAS program and graduate students by consent of instructor. Application of epidemiological principles to the study of maternal and child nutrition. Topics include quantitative and qualitative study procedures, including study design, data collection, and related analytical techniques.—(I.) Heinig

264A. Current Topics in Maternal and Child Nutrition: Principles of Adult Education (2)
Seminar—2 hours. Prerequisite: graduate standing; restricted to students enrolled in the MAS program and graduate students by consent of instructor. Current scientific literature related to Maternal and Child Nutrition in adult education settings. Topics include methods and theories of adult education and critical thinking skills related to research evaluation.—II. Heinig

264B. Current Topics in Maternal and Child Nutrition: Epidemiology and Evidence-Based Practice (2)
Seminar—2 hours. Prerequisite: graduate standing; restricted to students enrolled in the MAS program and graduate students by consent of instructor. Current scientific literature related to Maternal and Child Nutrition. Topics include epidemiology, evidence-based practice, breast feeding promotion, and nutritional assessment of populations.—II. Heinig

264C. Current Topics in Maternal and Child Nutrition: Public Policy Development and Implementation (2)
Seminar—2 hours. Prerequisite: graduate standing; restricted to students enrolled in the MAS program and graduate students by consent of instructor. Current scientific literature related to Maternal and Child Nutrition. Topics include nutrition surveillance and monitoring, as well as public policy development and implementation.—III. Heinig

270. Scientific Ethics in Biomedical Studies: Emphasis on Nutrition (3)
Lecture—1 hour; discussion—1 hour; term paper. Scientific ethics in biomedical studies, especially nutrition. Discussion and case study presentations on scientific integrity, fraud, misconduct, conflict of interest, human and animal research protections. Not open for credit to students who have completed course 492B.—Steinberg

290. Beginning Nutrition Seminar (2)
Lecture/discussion—1 hour; seminar—1 hour. Prerequisite: first year graduate standing. Discussion and critical evaluation of topics in nutrition with

emphasis on literature review and evaluation in this field. Students give oral presentations on relevant topics.—I. (I.)

290C. Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Major professors lead research discussions with their graduate students. Research papers are reviewed and project proposals presented and evaluated. Format will combine seminar and discussion style. (S/U grading only.)—I, II, III. (I, II, III.)

291. Advanced Nutrition Seminar (1)
Seminar—1 hour. Prerequisite: second-year graduate standing. Advanced topics in nutrition research. Multiple sections may be taken concurrently for credit. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

293A. Current Topics in Obesity, Food Intake and Energy Balance (3)
Lecture—1 hour; seminar—1 hour; discussion—1 hour. Prerequisite: graduate standing or course 129. Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. Current research and its evaluation. Principles of experimental design and scientific background for given article. Articles summarized for posting on Internet for use by healthcare professionals. May be repeated for credit with consent of instructor.—I. (I.) Stern

293B. Current Topics in Obesity, Food Intake, and Energy Balance with Special Topics (3)
Lecture—1 hour; seminar—1 hour; discussion—1 hour. Prerequisite: graduate standing or course 129. Undergraduates with upper division standing with at least one writing course may enroll with consent of instructor. A continuation of course 293A, with additional special topics. May be repeated for credit up to 3 times with consent of instructor.—II. (II.) Stern

294A. Current Topics in Developmental Nutrition (2)
Seminar—2 hours. Prerequisite: course 114 or 252 or consent of instructor. Effects of nutrition on embryology, morphogenesis, and developmental mechanisms. May be repeated for credit when topic differs.—I. (I.)

297T. Supervised Teaching in Nutrition (1-3)
Teaching under faculty supervision—3-9 hours. Prerequisite: graduate standing in nutrition or consent of instructor. Practical experience in teaching nutrition at the university level; curriculum design and evaluation; preparation and presentation of material. Assistance in laboratories, discussion sections, and evaluation of student work. (S/U grading only.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Professional Courses

492A. Professionalism: An Academic Perspective (2)
Lecture/discussion—2 hours. Prerequisite: graduate standing. For graduate students in their initial quarter of residence. Professionalism topics are presented and examples drawn from both the biological and social sciences.

492C. Grant Writing (3)
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: graduate standing in Nutrition or consent of instructor. Preparation of grants for governmental agencies (particularly NIH and USDA) and private foundations. Students will write a research grant or fellowship application. May be repeated one time for credit with consent of instructor. Offered in alternate years.—III. Stern

Nutritional Biology (A Graduate Group)

Sheri Zidenberg-Cherr, Ph.D., Chairperson of the Group

Graduate Group Office. 3202 Meyer Hall (530) 754-7684;
http://nutritionalbiology.ucdavis.edu

Faculty

Lars Berglund, Ph.D., Professor *(Endocrinology)*
Kenneth H. Brown, M.D., Professor *(Nutrition)*
C. Christopher Calvert, Ph.D., Professor *(Animal Science)*
Andrew J. Clifford, Ph.D., Professor *(Nutrition)*
Douglas E. Conklin, Ph.D., Associate Professor *(Animal Science)*
Edward J. DePeters, Ph.D., Professor *(Animal Science)*
Kathryn G. Dewey, Ph.D., Professor *(Nutrition)*
Kent L. Erickson, Ph.D., Professor *(Cell Biology and Human Anatomy)*
James G. Fadel, Ph.D., Professor *(Animal Science)*
Andrea J. Fascetti, D.V.M, Ph.D., Associate Professor *(Molecular Biosciences)*
J. Bruce German, Ph.D., Professor *(Food Science and Technology)*
M. Eric Gershwin, M.D., Professor *(Internal Medicine)*
Ralph Green, M.D., Professor *(Pathology)*
Jean-Xavier Guinard, Ph.D., Professor *(Food Science and Technology)*
Fawaz G. Haj, Ph.D., Assistant Professor *(Nutrition)*
Silas S. O. Hung, Ph.D., Professor *(Animal Science)*
Thomas Jue, Ph.D., Professor *(Biological Chemistry)*
Sidika E. Kasim-Karakas, M.D., Professor *(Internal Medicine)*
George A. Kaysen, M.D., Ph.D., Professor *(Internal Medicine)*
Carl L. Keen, Ph.D., Distinguished Professor *(Nutrition, Internal Medicine)*
Kirk C. Klasing, Ph.D., Professor *(Animal Science)*
Jennifer A. Larsen, Ph.D., Assistant Professor of Clinical Nutrition *(Molecular Biosciences)*
Bo L. Lönnerdal, Ph.D., Professor *(Nutrition, Internal Medicine)*
Stanley L. Marks, B.V.Sc., Ph.D. Associate Professor *(Medicine and Epidemiology)*
Roger B. McDonald, Ph.D., Associate Professor *(Nutrition)*
Alyson Mitchell, Ph.D., Professor *(Food Science and Technology)*
Patricia Oteiza, Ph.D., Associate Professor *(Nutrition, Environmental Toxicology)*
Anthony F. Philipps, M.D., Professor *(Pediatrics)*
Jon J. Ramsey, Ph.D., Associate Professor *(Molecular Biosciences)*
Helen E. Raybould, Ph.D., Professor *(Anatomy, Physiology and Cell Biology)*
John C. Rutledge, Ph.D., Professor *(Endocrinology)*
Roberto D. Sainz, Ph.D., Associate Professor *(Animal Science)*
Jose Santos, Ph.D., Associate Professor *(VMTRC)*
Francene M. Steinberg, Ph.D., R.D., Professor *(Nutrition)*
Charles Stebbins, Ph.D., Professor *(Cardiovascular Medicine)*
Judith S. Stern, Sc.D., R.D., Distinguished Professor *(Nutrition, Internal Medicine)*
Christine P. Stewart, Ph.D., Assistant Professor *(Nutrition)*
Natalie Torok, Ph.D., Associate Professor *(Gastroenterology & Hepatology)*
Craig H. Warden, Ph.D., Associate Professor *(Neurobiology, Physiology, and Behavior)*
Vincent A. Ziboh, Ph.D., Professor *(Dermatology, Biological Chemistry)*

Emeriti Faculty

Harry W. Colvin, Jr., Ph.D., Professor Emeritus
Robert E. Feeney, Ph.D., Professor Emeritus
Richard A. Freedland, Ph.D., Professor Emeritus
William N. Garrett, Ph.D., Professor Emeritus
Dorothy W. Gietzen, Ph.D., Professor Emeritus
C. Richard Grau, Ph.D., Professor Emeritus
Louis Grivetti, Ph.D., Professor Emeritus
Charles H. Halsted, M.D., Professor Emeritus
Robert J. Hansen, Ph.D., Professor Emeritus
Jiro J. Kaneko, D.V.M., Ph.D., D.V.Sc. (hc), Professor Emeritus
Janet King, Ph.D., Professor Emeritus
Verne E. Mendel, Ph.D., Professor Emeritus
James G. Morris, Ph.D., Professor Emeritus
Ernesto Pollitt, Ph.D., Professor Emeritus
Quinton R. Rogers, Ph.D., Professor Emeritus
Barbara O. Schneeman, Ph.D., Professor Emeritus
Howard G. Schutz, Ph.D., Professor Emeritus
Donal A. Walsh, Ph.D., Professor
Bruce M. Wolfe, M.D., Professor Emeritus
Frances J. Zeman, Ph.D., Professor Emeritus

Affiliated Faculty

Lindsay H. Allen, Ph.D., RD, Professor *(Nutrition)*
Betty Burri, Ph.D., Associate Adjunct Professor *(Nutrition)*
Britt Burton-Freeman, Ph.D., Assistant Research Nutritionist *(Nutrition)*
Paul A. Davis, Ph.D., Research Nutritionist *(Nutrition)*
Cesar Fraga, Ph.D., Research Chemist *(Nutrition)*
Wayne Chris Hawkes, Ph.D., Assistant Adjunct Professor *(Nutrition)*
Peter J. Havel, D.V.M., Ph.D., Professor *(Molecular BioSciences)*
Liping Huang, Ph.D., Assistant Adjunct Professor *(Nutrition)*
Daniel Hwang, Ph.D., Adjunct Professor *(Nutrition)*
Amy Block Joy, Ph.D., Specialist in Cooperative Extension
Lucia Kaiser, Ph.D., RD, Specialist in Cooperative Extension *(Nutrition)*
Nancy L. Keim, Ph.D., R.D., Adjunct Professor *(Nutrition)*
Darshan S. Kelley, Ph.D., Adjunct Professor *(Nutrition)*
Kevin Laugero, Ph.D., Assistant Adjunct Professor *(Nutrition)*
Joshua W. Miller, Ph.D., Associate Adjunct Professor *(Pathology)*
John Newman, Ph.D., Assistant Adjunct Professor *(Nutrition)*
James W. Oltjen, Ph.D., Management Systems Specialist *(Animal Science)*
Peter H. Robinson, Ph.D., Associate Extension Specialist *(Animal Science)*
Charles B. Stephensen, Ph.D., Adjunct Professor *(Nutrition)*
Marta D. Van Loan, Ph.D., Adjunct Professor *(Nutrition)*
Sheri A. Zidenberg-Cherr, Ph.D., Specialist in Cooperative Extension *(Nutrition)*
Susan Zunino, Ph.D., Associate Adjunct Professor *(Nutrition)*

Graduate Study. The Graduate Group in Nutritional Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. The great diversity of research interests represented by the faculty members allows students to choose from a wide variety of themes: nutritional biochemistry, animal nutrition, nutrition and development, nutrient bioavailability, human/clinical nutrition, nutrition and behavior, nutritional energetics, community nutrition, community health, maternal and child nutrition, nutrition and endocrinology, international nutrition, obesity/body composition, physiology of digestion, nutrition and chronic disease, culture and nutrition, nutrition and gene expression, nutrition and aging, food preferences, nutrition and immunity, diet and exercise, dietary assessment, protein and lipid metabolism, food intake regulation, nutrition education.

Graduate Advisers. Consult the Nutritional Biology Graduate Group office.

Nutrition Science

(College of Agricultural and Environmental Sciences)

Faculty

See the Department of Nutrition, on page 440.

The Major Program

The study of nutrition encompasses all aspects of the consumption and utilization of food and its constituents. Key areas of study include the biochemical reactions important to utilization of nutrients and food constituents and to the impact of diet on health and disease, and nutrition-related policy and public health issues. The nutrition science major includes two options for studying these areas: *nutritional biochemistry and community nutrition*.

The Program. Nutrition as it is taught on the Davis campus is a biological science and requires a complete background in chemistry and biology, along with calculus and either physics (nutritional biochemistry option) or economics (community nutrition option). These courses are generally completed during the first two years, and along with biochemistry, must be completed before most nutrition classes can be taken. During their junior and senior years, students in the nutritional biochemistry option take additional course work in biochemistry, genetics, microbiology, physiology, immunology, and/or toxicology. Students in the community nutrition option take additional course work in social and health-related sciences.

Career Alternatives. Both options are excellent preparation for professional or graduate training in medicine, public health, or other health sciences. The nutritional biochemistry option also provides preparation for technical work in nutrition in the animal, food, and pharmaceutical industries. The community nutrition option prepares students for jobs in administrative, teaching, or public health/public service positions. Students who complete the additional academic requirements for an internship in dietetics are also qualified for careers in dietetics following completion of an internship.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 62-65

- Anthropology 2 or Geography 2 or Sociology 3 4
- Biological Sciences 2A, 2B & 2C 14
- Chemistry 2A-2B-2C and 8A-8B, or 118A-118B, or 128A-128B and 129A..... 21-23
- Mathematics 16A-16B 6
- Physics 1A-1B (Nutritional Biochemistry option) or Economics 1A-1B (Community Nutrition option)..... 6-10
- Sociology 46A or Psychology 41 4
- Statistics 13 or Agricultural Management and Rangeland Resources 120 4

Depth Subject Matter..... 57-58

- Animal Biology 102, 103 10
- Biological Sciences 101..... 4
- Food Science and Technology 100A and 100B..... 8
- Neurobiology, Physiology, and Behavior 101, 101L..... 8
- Nutrition 111AV, 111B, 112, 116A, 116B, 190..... 15
- Additional Upper Division Nutrition 5

Nutritional Biochemistry option:

- Nutrition 117..... 6

Community Nutrition option:

- Nutrition 118, 130/192 (2 units)..... 6

Restricted Electives 20

Select one of the two options.

Nutritional Biochemistry option:

- Molecular and Cellular Biology 120L..... 6
- Additional courses in genetics, biochemistry, microbial biology, physiology, immunology, or toxicology, chosen from the following list in consultation with the faculty adviser..... 14
  - Animal Genetics 111, Animal Science 123, 124, Anthropology 153, Biological Sciences 104, Cell Biology and Human Anatomy 101, 101L, Environmental Toxicology 101, 128, Exercise Biology 101, 102, 110, Food Science and Technology 104, 123-123L, 128, Molecular and Cellular Biology 121, 122, 123, 150-150L, 161, 162, 163, Microbiology 101, 102, 102L, 160, Medical Microbiology 130, Neurobiology, Physiology, and Behavior 112, 113, 114, 121, 130, 161, Nutrition 104, 105, 114, 127, Plant Science 121, Psychology121, Population, Health, and Reproduction 150, Pathology, Microbiology, and Immunology 126, 127, 128.

Community Nutrition option:

- Economics 100-101 or Agricultural and Resource Economics 100A-100B 8
- Additional courses chosen from the following list in consultation with the faculty adviser 12
  - African American and African Studies 100, Agricultural and Resource Economics 15, 120, 130, Anthropology 101, 122A, 126A, 126B, Asian American Studies 100, Chicana/o Studies 110, Community and Regional Development 2, 151, 152, 153A, 153B, 172, 174, 176, Consumer Science 100, Economics 115A, 115B, 130, 151A, 151B, 162, Education 110, 153, Environmental Science and Policy 126, 165, Environmental Toxicology 101, 128, Epidemiology and Preventive Medicine 101, 160, Exercise Biology 101, 102, 110, 113, 117, Food Science and Technology 104, Geography 170, Human Development 100A, 100B, 100C, International Agricultural Development 10, 103, 110, 111, 195A, 195B, Microbiology 101, Native American Studies 115, Nutrition 104, 105, 114, 127, Plant Science 150, 151, Political Science 105, Psychology 1, 121, 126, 130, 140, 151, 168, Sociology 145A, 145B, 154, 170.

Total Units for the Degree 143

Major Adviser. B. L. Lönnerdal

Advising Center for the major is located in 3211 Meyer Hall (530) 752-2512.

Dietetics Internship. To fulfill the academic requirements for an internship in Dietetics, choose the following courses from the categories in which they appear above: English 3 or University Writing Program 1, Psychology 1, Communication 1, Sociology 3 or Anthropology 2, Economics 1A or 1B, Nutrition 116AL-BL, 118. The following courses must also be added (some of which may meet restricted elective requirements): Agricultural and Resource Economics 112; Food Science and Technology 101A, 101B; Food Service Management 120, 120L, 122; Food Science and Technology 104, 104L. Students intending to apply for admission to a dietetic internship should contact the Advising office no later than the first quarter of the junior year for information on procedures.

Graduate Study. The Department of Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees in Nutrition. For information on graduate study contact the graduate adviser. See also Graduate Studies, on page 109.

Obstetrics and Gynecology

See Medicine, School of, on page 380.

Oceanography

(College of Letters and Science)

Oceanography is the study of the earth's oceans, investigating connections between geological, biological, chemical and physical processes in the marine realm, and the interactions between the Earth's ocean/atmosphere system. The interdisciplinary minor in oceanography is for students with backgrounds in any of these fields, as well as those interested in marine policy and conservation. The curriculum reflects the integrative nature of oceanography, with core courses covering the major disciplines in oceanography and elective courses that allow students to cater the minor to their interests. The oceanography minor includes courses taught at the Davis campus and courses offered at Bodega Marine Laboratory.

The minor is sponsored by the Department of Geology in 2119 Earth and Physical Sciences Building.

Minor Program Requirements:

UNITS

Oceanography 22-24

- Geology 150A/Environmental Science and Policy 150A..... 4
- Geology 150B/Environmental Science and Policy 150B 3
- Geology 150C/Environmental Science and Policy 150C..... 4
- Environmental Science and Policy 152 3
- An electives sequence, with one course from group (a) and one to two additional electives from either groups (a) or (b): 8-10
  - *(a)* Geology 116N/Environmental Science and Policy 116N, Atmospheric Science 158, Wildlife, Fish, and Conservation Biology 120, 157, Environmental Toxicology 120, Evolution and Ecology 112, 115;
  - *(b)* Atmospheric Science 121A, 121B, Geology 108, 109, 152, Evolution and Ecology 106, 114, Environmental Science and Policy 124, Environmental Toxicology 127

Note. Courses Geology 150C/ Environmental Science and Policy 150C, Environmental Science and Policy 124, 152, Environmental Toxicology 127, and Evolution and Ecology 106 and 114 are taught at Bodega Marine Laboratory.

Minor Adviser. T.M. Hill *(Geology)*, 3115 Earth and Physical Sciences Building (530) 752-0179

Ophthalmology

See Medicine, School of, on page 380.

Organizational Studies

See Sociology, on page 487.

Orthopaedic Surgery

See Medicine, School of, on page 380.

Otolaryngology

See Medicine, School of, on page 380.

Parks and Recreation

See Community and Regional Development, on page 198; Design, on page 210; Environmental Planning and Management (under Environmental Horticulture, on page 286); Landscape Architecture, on page 354; and Physical Education, on page 449.

Pathology

See Pathology (PMD), on page 403; Pathology, Microbiology, and Immunology, on page 445; and Plant Pathology, on page 460.

Pathology, Microbiology, and Immunology

See Veterinary Medicine, School of, on page 517.

Pediatrics

See Medicine, School of, on page 380.

Pharmacology and Toxicology

See Medical Pharmacology and Toxicology (PHA), on page 400; Molecular Biosciences (VMB), on page 524; and Pharmacology and Toxicology (A Graduate Group), on page 445.

Performance Studies (A Graduate Group)

Lynette Hunter, Chairperson of the Group

Victoria Dye, Graduate Administrator

Arts Group Graduate Office. 243 Wright Hall
(530) 752-8710; *vedye@ucdavis.edu*
http://theatredance.ucdavis.edu/phd/

Faculty. Executive: Seeta Chaganti *(English)*, Elizabeth Constable *(Women and Gender Studies)*, Maxine Craig *(Women and Gender Studies)*, Lynette Hunter *(Theatre and Dance)*, Jon Rossini *(Theatre and Dance)*, Halifu Osumare *(African American and African Studies)*

There are over 20 affiliated faculty in departments throughout HArCS, all of whom offer courses relevant to the discipline.

Graduate Study. The Ph.D. in Performance Studies is a four-year program. In the first two years of study, students develop an understanding of performance by drawing from a range of regular course offerings in the field to identify, explore, and define a field or fields of research. Students are required to complete four core courses out of five in performance studies. Each individual program is then built from seminar and/or practice as research courses, as well as independent or group studies, developing one or more of the three strands of the program: Comparative Medias, Embodments, Cultures/Ecologies. A wide range of affiliated faculty offer courses throughout the HArCS faculty, and Designated Emphases are available in Studies in Performance and Practice, African American and African Studies, Critical Theory, Feminist Theory and Research, Native American Studies, and Writing, Rhetoric and Composition Studies. Students are required to complete a minimum of 60 units before taking the qualifying examination. No more than 12 units may be taken below the graduate level unless specifically approved by the PhD graduate program adviser.

Main Program Adviser. Lynette Hunter *(Theatre and Dance)*

Graduate Advisers. Jon Rossini *(Theatre and Dance)*, Seeta Chaganti *(English)*, Elizabeth Constable *(Women and Gender Studies)*, Maxine Craig *(Women and Gender Studies)*, Halifu Osumare *(African American and African Studies)*

Courses in Performance Studies (PER)

Courses were pending approval at the time of publication. For more information on courses, see *http://theatredance.ucdavis.edu/phd/*

Pharmacology and Toxicology (A Graduate Group)

_____, Chairperson of the Group

Group Office. 4117 Meyer Hall (Department of Environmental Toxicology
(530) 752-4516;
http://www.envtox.ucdavis.edu/ptx

Faculty. The 76 faculty in the graduate group are from more than 27 academic departments and organized research units within the College of Agricultural and Environmental Sciences, the School of Medicine and the School of Veterinary Medicine.

Graduate Study. The program of study and research leading to the Ph.D. degree emphasizes an interdisciplinary approach to graduate student training. Many specialty areas in pharmacology and toxicology are represented in the research interests of the faculty. Graduate students can study areas of pharmacology and toxicology which emphasize the effects of chemicals in the environment, on human health, and on ecosystems. Molecular and analytical approaches are used to study reproductive, genetic and developmental, respiratory and neurological systems, as well as metabolic fate and pharmacokinetics. Career opportunities include teaching in professional schools and hospitals, laboratory research in academia, government, industry, environmental control, and agricultural and drug regulatory agencies. For detailed information on the program, contact the Group office, appropriate graduate adviser, or the group chairperson.

Individual courses are taught under departments of faculty in the group, including Environmental Toxicology, Molecular and Biological Sciences, Animal Physiology, Veterinary Medicine, and the School of Medicine.

Graduate Advisers. A.R. Buckpitt *(Molecular Biosciences)*, K. Carraway *(Biochemistry & Molecular Medicine)*, T. Goldkorn *(Pulmonary Medicine)*, J.A. Last *(Pulmonary Medicine)*, M.G. Miller *(Environmental Toxicology)*, K. Pinkerton *(Institute of Toxicology and Environmental Health)*, B. Puschner *(Molecular Biosciences)*, R. Wu *(Pulmonary Medicine)*

Courses in Pharmacology and Toxicology (PTX)

Graduate Courses

201. Principles of Pharmacology and Toxicology I (5)
Lecture—5 hours. Prerequisite: Biological Sciences 102 and Neurobiology, Physiology, and Behavior 101. First of three courses presenting fundamental principles of pharmacology and toxicology. Introductory overview of basic concepts in pharmacology/toxicology, followed by in-depth blocks on fate processes of chemicals in the body, fate processes in tissue selective responses, selective toxicity employed therapeutically.—I. (I.)

202. Principles of Pharmacology and Toxicology II (4)
Lecture—4 hours. Prerequisite: course 201. The second of three courses presenting fundamental principles of pharmacology and toxicology. Principles of pharmacodynamics and mechanisms of drug/toxicant actions.—II. (II.)

203. Principles of Pharmacology and Toxicology III (4)
Lecture—4 hours. Prerequisite: courses 201 and 202. Integrated physiological systems, cardiovascular and nervous systems and how drugs and toxicants act to perturb function.—III. (III.)

230. Advanced Topics in Pharmacology and Toxicology (1-3)
Lecture/discussion/seminar—1 hour each (course format can vary at option of instructor). Prerequisite: course 201 and consent of instructor. In-depth coverage of selected topics for graduate students in Pharmacology-Toxicology and related disciplines. Topics determined by instructor in charge for each quarter.—I, II, III. (I, II, III.)

277. Life and Death Decisions at the Cellular Level (2)
Lecture—2 hours. Prerequisite: undergraduate or graduate introductory course in cell biology (such as Biological Sciences 104), and general biochemistry (Molecular and Cellular Biology 121 or 122) required; restricted to graduate standing or consent of instructor. Fundamental concepts in cell signaling; signaling pathways as related to cell death and a variety of human diseases including cancer, Alzheimer's, and Parkinson's.—III. (III.) Goldkorn

290. Seminar (1)
Current topics in pharmacology and toxicology. (S/U grading only.)—I, II, III. (I, II, III.)

299. Research (1-12)
(S/U grading only.)

Philosophy

(College of Letters and Science)

James R. Griesemer, Ph.D., Chairperson of the Department

Department Office. 1240 Social Sciences and Humanities Building
(530) 752-0703; *http://philosophy.ucdavis.edu*

Faculty

Aldo Antonelli, Ph.D., Professor
David Copp, Ph.D., Professor
Gerald Dworkin, Ph.D., Professor
Cody Gilmore, Ph.D., Assistant Professor
Michael Glanzberg, Ph. D., Professor
James R. Griesemer, Ph.D., Professor
Elaine M. Landry, Ph.D., Associate Professor
George J. Mattey II, Ph.D., Senior Lecturer
Robert May, Ph.D., Professor
Roberta Millstein, Ph.D., Professor
Bernard Molyneux, Ph.D., Assistant Professor
Marina A. L. Oshana, Ph.D., Professor
Adam Sennet, Ph.D., Assistant Professor
Jan Szaif, Ph.D., Professor

Emeriti Faculty

William H. Bossart, Ph.D., Professor Emeritus
Robert C. Cummins, Ph.D., Professor Emeritus
Joel I. Friedman, Ph.D., Professor Emeritus
Neal W. Gilbert, Ph.D., Professor Emeritus
Michael Jubien, Ph.D., Professor Emeritus
John F. Malcolm, Ph.D., Professor Emeritus
Paul Teller, Ph.D., Professor Emeritus
Michael V. Wedin, Ph.D., Professor Emeritus
George Wilson, Ph.D., Professor Emeritus

The Major Program

Philosophy addresses problems and questions that arise in all areas of human thought and experience and in all disciplines. Recurring questions about the nature of value, the good life, right conduct, knowledge, truth, language, mind, and reality are central to philosophical study. Philosophy also investigates the methodologies and assumptions of the major disciplines in the university in order to deepen our understanding of the sciences, of mathematics, art, literature, and history, and of religion and morality. It leads us to address issues about the nature of these subjects, about the methods of reasoning characteristic of them, and about the contributions they make to our understanding of ourselves and our world.

Philosophy contributes to the liberal education of its students. The department emphasizes an analytic approach to philosophical questions, which trains students to understand and evaluate arguments and to think and write precisely and clearly. These skills are of immense value in a variety of careers.

The Program. The Department of Philosophy offers courses in such areas as the theory of knowledge, metaphysics, logic, ethics, and political philosophy. In addition, upper division courses are offered in moral and political philosophy, and aesthetics, and in the philosophy of religion, of mind, of language, of mathematics, of law, and of the physical, biological, and social sciences.

The problems of philosophy have important roots in past. The history of philosophy is important not only as part of the heritage of educated persons, but also because it is relevant to contemporary issues. For these reasons, the department places great emphasis on the history of philosophy, providing courses on the major figures and traditions of western philosophy.

Career Alternatives. Students of philosophy learn to understand and evaluate arguments and to think and write precisely and clearly. These analytical skills are assets in any career. Many of our majors have pursued graduate study in philosophy and have become philosophers in their own right. Others have pursued academic careers in related disciplines in the humanities and social sciences. Philosophy majors are well prepared for law, business, or other professional schools and have found careers in computer programming, government service, teaching, the ministry, and social work.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 16

One course from any three of the following areas..... 12
(a) General Philosophy: Philosophy 1
(b) Ancient Philosophy: Philosophy 21
(c) Early Modern Philosophy: Philosophy 22
(d) Philosophy of Mind: Philosophy 13
(e) Ethics: Philosophy 14, 15 or 24
(f) Philosophy of Science: Philosophy 30, 31, 32 or 38
(g) Philosophy of Language: Philosophy 17
(h) Metaphysics: Philosophy 101
(i) Theory of Knowledge: Philosophy 102
Philosophy 12..... 4

Depth Subject Matter 36

Upper division units in Philosophy 36
Note: Philosophy 101 and 102 may not be counted toward both preparatory and depth subject matter units.

Total Units for the Major 52

Major Adviser. G.J. Mattey

Advising Office. 1240 Social Science and Humanities

Minor Program Requirements:

Students wishing to minor in Philosophy may choose a general minor or a minor specializing in logic. There are no specific courses required for the general minor, so students may create a program to suit their own interests. The range of choice in the logic specialization is limited to the courses listed.

UNITS

Philosophy—General 20

Twenty upper division units in philosophy. Philosophy 12 may be substituted for four of the upper division units.

Philosophy—Logic..... 20

Philosophy 12 or Mathematics 108..... 4
Philosophy 112..... 4
Select units from Philosophy 113, 131, 134, 135, 189K..... 12

Minor Adviser. G.J. Mattey

Honors Program. The department offers an honors program, which gives qualifying majors the opportunity to work closely with faculty and graduate students.

Courses for Non-Majors. Students majoring in most disciplines in the university will find courses relevant to their educational or career goals. Philosophy 1 is the introductory course for non-majors. Philosophy 5 teaches critical thinking. The following courses are recommended:

(1) Pre-law: 12, 14, 24, 30, 102, 112, 115, 116, 118 and, especially, 119;
(2) Pre-medical: 14, 30, 108, 114, 115, 116;
(3) Business: 14, 102, 112, 114, 115, 116, 117, 118, 119;
(4) Social Policy: 14, 24, 101, 102, 114, 115, 116, 117, 118, 119;
(5) Social Sciences: 12, 30, 31, 32, 101, 102, 103, 109, 118, 131;
(6) Physical Sciences: 12, 30, 31, 32, 101, 102, 106, 107, 112, 131;
(7) Biological Sciences: 30, 31, 32, 101, 102, 108;
(8) Humanities and the Arts: 14, 21 through 24, 101, 102, 103, 105, 114, 116, 118, 123, 160 through 175;
(9) Agricultural and Environmental Science and Policy: 5, 14, 24, 30, 31, 114, 115, 116, 118.

Department Activities. The Philosophy department sponsors a lecture-seminar series of well-known philosophers who present papers in their fields of expertise. The department also operates ongoing faculty and graduate student colloquia. Undergraduate students are welcome to attend and join these discussions. Information can be obtained in the Department office.

Graduate Study. The Department of Philosophy offers programs of study leading to the M.A. and Ph.D. degrees. Detailed information may be obtained by writing to the Graduate Adviser.

Graduate Adviser. Elaine M. Landry

Courses in Philosophy (PHI)

Lower Division Courses

1. Introduction to Philosophy (4)
Lecture—3 hours; discussion—1 hour. Problems of philosophy through major writings from various periods. Problems are drawn from political, aesthetic, religious, metaphysical, and epistemological concerns of philosophy. GE credit: ArtHum, Wrt.—I, II, III. (I, II, III.)

5. Critical Reasoning (4)
Lecture—3 hours; discussion—1 hour. Criteria of good reasoning in everyday life and in science. Topics to be covered may include basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Not open to students who have completed course 6. GE credit: Wrt.

11. Philosophy East and West (4)
Lecture—3 hours; discussion—1 hour. Comparative treatment of select theories in Eastern and Western philosophy, e.g., of self, God, being, knowledge, enlightenment. Topics selected from the following philosophies: Eastern—Buddhist, Confucian, Hindu, Taoist; and Western—Platonist, Aristotelian, Medieval Christian, Modern Rationalist/Empiricist, Kantian, Hegelian, Existentialist. GE credit: ArtHum, Div, Wrt.

12. Introduction to Symbolic Logic (4)
Lecture—3 hours; discussion—1 hour. Syntax and semantics of the symbolic language sentence logic. Symbols of sentence logic. Translation between sentence logic and English. Truth table interpretation of sentence logic. Proof techniques. Application of truth tables and proof techniques to arguments in English. Not open for credit to students who have taken course 112, 113, 131, 134, or 135.—I, IV. (I, IV.) Gilmore

13. Minds, Brains, and Computers (4)
Lecture—3 hours; discussion—1 hour. Contemporary theories of the nature of the mind. The mind as a brain process and as a computer process. Ways in which neuroscience, artificial intelligence and psychology seek to understand the mind. GE credit: SciEng or SocSci, Wrt.—Molyneux

14. Ethical and Social Problems in Contemporary Society (4)
Lecture—3 hours; discussion—1 hour. Philosophical issues and positions involved in contemporary moral and social problems. Possible topics include civil disobedience and revolution, racial and sex discrimination, environment, population control, technology and human values, sexual morality, freedom in society. GE credit: ArtHum, Div, Wrt.

15. Bioethics (4)
Lecture—3 hours; discussion–1 hour. Critical analysis of normative issues raised by contemporary medicine and biology. Possible topics include euthanasia, abortion, reproductive technologies, genetic engineering, practitioner/patient relationships, allocation of medical resources, experimentation on human subjects. GE credit: ArtHum, Wrt.—Dworkin

16. Philosophical Foundations of American Democracy (4)
Lecture—3 hours; discussion–1 hour. The philosophical underpinnings of democratic government and the tension between the goals of providing security and of preserving democracy and civil liberties. Illustration of the tension through focus on issues related to war and terrorism.—I. Copp

17. Language, Thought, and World (4)
Lecture—3 hours; discussion–1 hour. Puzzles in the philosophy of language, such as what language is, how language conveys thoughts, whether we each speak our own private language, and what we can learn about the world by studying language. GE credit: SocSci, Wrt.—May

21. History of Philosophy: Ancient (4)
Lecture—3 hours; discussion—1 hour. Survey of Greek philosophy with special attention to the Pre-Socratics, Plato, and Aristotle. GE credit: ArtHum, Wrt.—Szaif

22. History of Philosophy: Early Modern (4)
Lecture—3 hours; discussion—1 hour. Survey of major figures in philosophy of the seventeenth and eighteenth centuries, with emphasis on Descartes, Hume, and Kant. GE credit: ArtHum, Wrt.—II. (II.) Mattey

24. Introduction to Ethics and Political Philosophy (4)
Lecture—3 hours; discussion—1 hour. Reading of historical and contemporary works highlighting central problems in ethical theory and political philosophy. Why should we be moral? What is moral behavior? What is justice, both for the individual and for society? Is there a right of rebellion? GE credit: ArtHum, Wrt.—Oshana

30. Introduction to Philosophy of Science (4)
Lecture—3 hours; discussion—1 hour. Basic problems in the philosophy of science, common to the physical, biological, and social sciences. Analysis of explanation, confirmation theory, observational and theoretical terms, the nature of theories, operationalism and behaviorism, realism, reduction. Not open for credit to students who have taken course 104. GE credit: ArtHum or SciEng, Wrt.—Landry, Millstein

31. Appraising Scientific Reasoning (4)
Lecture—3 hours; discussion—1 hour. Introduction to scientific hypotheses and the kinds of reasoning used to justify such hypotheses. Emphasis on adequate justification, criteria, and strategies for distinguishing scientific from pseudoscientific theories. Concrete historical and contemporary cases. GE credit: ArtHum or SciEng.—Griesemer

32. Understanding Scientific Change (4)
Lecture—3 hours; discussion—1 hour. Concepts of scientific change in historical and philosophical perspective. Survey of models of growth of knowledge, 17th century to present. Relationship between logic of theories and theory choice. Kuhn's revolution model. Examples from various sciences. GE credit: ArtHum or SciEng, Wrt.—Griesemer

38. Introduction to Philosophy of Biology (4)
Lecture—3 hours; discussion—1 hour. Non-technical introduction to philosophical, social, and scientific ideas, methods and technologies in contemporary biological fields such as evolution, genetics, molecular biology, ecology, behavior. Philosophical consideration of determinism, reductionism, explanation, theory, modeling, observation, experimentation. Evaluation of scientific explanations of human nature. GE credit: ArtHum, Wrt.—Griesemer, Millstein

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

(Certain upper division courses may not be offered every year.)

101. Metaphysics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy recommended. Theories of being. Such topics as reality, substance, universals, space, time, causality, becoming, body, experience, persons, freedom, and determinism. Views of the nature and method of metaphysics. Anti-metaphysical arguments. GE credit: ArtHum, Wrt.—Gilmore

102. Theory of Knowledge (4)
Lecture—3 hours; extensive writing or discussion. Prerequisite: one course in philosophy. Analysis of the concept of knowledge. The relation between knowledge, belief and truth. Development of foundationalist, coherentist and externalist theories of justified belief. Examination of skepticism. GE credit: ArtHum, Wrt.—Mattey

103. Philosophy of Mind (4)
Lecture/discussion—3 hours; term paper. The relation between mind and body, our knowledge of other minds, and the explanation of mental acts. Discussion of such concepts as action, intention, and causation. GE credit: ArtHum, Wrt.—Molyneux

104. The Evolution of Mind (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one previous Philosophy course or instructor permission. The interpretation of human thought and behavior through the lens of evolutionary theory. Topics include the nature/nurture debate concerning cognitive and other mental capacities and traits, and the interaction between evolution, learning and development. GE Credit: SocSci.

105. Philosophy of Religion (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy recommended. Logical, metaphysical, epistemological, and existential aspects of selected religious concepts and problems. GE credit: ArtHum, Wrt.—Gilmore, Szaif

107. Philosophy of the Physical Sciences (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one philosophy course or a science background recommended. Nature of testability and confirmation of scientific hypotheses; nature of scientific laws, theories, explanations, and models. Problems of causality, determininism, induction, and probability; the structure of scientific revolutions. GE credit: ArtHum or SciEng, Wrt.

108. Philosophy of the Biological Sciences (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in biology or one course in philosophy. Scientific method in biology. Nature of biological theories, explanations, and models. Problems of evolutionary theory, ecology, genetics, and sociobiology. Science and human values. GE credit: ArtHum or SciEng, Wrt.—Griesemer, Millstein

109. Philosophy of the Social Sciences (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy or a social science recommended. The nature of the social sciences, their subject matter and methods. Similarities to and differences from natural and life sciences. Predicting and explaining human behavior. Behaviorism. Reduction, holism, and individualism. Related moral issues. The social sciences and philosophy. GE credit: ArtHum or SocSci, Wrt.

111. Philosophy of Space and Time (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one upper division philosophy course. Philosophical problems of space and time. The philosophical implications of space-time theories, such as those of Newton and Einstein. Topics may include the nature of geometry, conventionalism, absolutist versus relationist views of space and time, philosophical impact of relativity theory.—Gilmore

112. Intermediate Symbolic Logic (4)
Lecture/discussion—4 hours. Prerequisite: course 12 or consent of instructor. Predicate logic syntax and semantics. Transcription between predicate logic and English. Proof techniques. Identity, functions, and definite descriptions. Introduction to concepts of metatheory.—II. (II.) Landry, Mattey

113. Metalogic (4)
Lecture/discussion—4 hours. Prerequisite: course 112, Mathematics 108, or the equivalent. The metalogic of classical propositional and first-order predicate logic. Consistency, soundness and completeness of both propositional and predicate logic. The Löwenheim-Skolem theorem for predicate logic. Undecidablity of predicate logic.—(III.) Antonelli

114. History of Ethics (4)
Lecture/discussion—4 hours. Prerequisite: one philosophy course. Study of some classic texts from the history of philosophical writing on central problems of ethics, taking the form either of a survey or concentrated examination of selected historical figures. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill. GE credit: ArtHum, Wrt.—Mattey

115. Problems in Normative Ethics (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy. Moral philosophy studied through examination of moral problems and the moral principles and common sense intuitions that bear on them. Problems discussed may include: animal rights, fetal rights, euthanasia, justice and health care, war, nuclear deterrence, world hunger, environmental protection. GE credit: ArtHum, Wrt.—Millstein

116. Ethical Theories (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy; one course in ethics recommended. Study of fundamental concepts and problems in ethical theory through an examination of classical and contemporary philosophical theories of ethics. Among the theories that may be discussed are utilitarianism, virtue theory, theories of natural rights, Kantian ethical theory, and contractarianism.—Copp

117. Foundations of Ethics (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one of courses 114, 115, 116, 101, or 137. Advanced investigation of questions about the nature and foundations of morality. Among the topics that may be discussed are moral realism and anti-realism, cognitivism and non-cognitivism, types of relativism, moral skepticism, normative language and normative belief.—Copp

118. Political Philosophy (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. GE credit: SocSci, Div, Wrt.—Oshana

119. Philosophy of Law (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one course in philosophy or consent of instructor. Philosophical theories of the nature of law, legal obligation, the relation of law and morals. Problems for law involving liberty and justice: freedom of expression, privacy, rights, discrimination and fairness, responsibility, and punishment. GE credit: SocSci, Div, Wrt.—Dworkin, Oshana

123. Aesthetics (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Nature of art, of artistic creation, of the work of art, and of aesthetic experience; nature and validity of criticism; relations of art to its environment. GE credit: ArtHum, Wrt.

125. Theory of Action (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: one course in Philosophy. Survey of prominent contemporary approaches to leading problems in action theory. Problems include issues about the nature of intentional action and the conceptual character of explanations of actions in terms of the agent's reasons. GE credit: ArtHum, Wrt.

128. Rationality (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: at least one course in philosophy. Philosophical issues concerning rationality in its various forms. Focus is on theoretical and practical reasoning and conditions for rational belief, choice, and action. Possible additional topics include rationality and human limitations; paradoxes of rationality; varieties of irrationality; rationality and objectivity.—Antonellil

131. Philosophy of Logic and Mathematics (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 12 or one course for credit in mathematics. Nature of formal systems and mathematical theories. Selected topics include logical and semantical paradoxes; foundations of mathematics; set theory, type theory, and intuitionistic theory; philosophy of geometry; philosophical implications of Gödel's incompleteness results.—Glanzberg, Landry

134. Modal Logic (4)
Lecture/discussion—4 hours. Prerequisite: course 112 or Mathematics 108 or the equivalent. Survey of the main systems of modal logic, including Lewis systems S4 and S5. "Possible worlds" semantics and formal proofs. Applications to epistemology, ethics, or temporality.—Antonelli

135. Alternative Logics (4)
Lecture/discussion—4 hours. Prerequisite: course 12, Mathematics 108, or the equivalent. Alternatives to standard truth-functional logic, including many-valued logics, intuitionist logics, relevance logics, and non-monotonic logics.—Antonelli

137A. Philosophy of Language: Theory of Reference (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in philosophy or linguistics. Survey of issues and views concerning reference, or how words refer to things. Topics include names and descriptions, the distinction between sense and reference, the puzzle of non-referring terms, causal theories of reference, and possibility and necessity. Only two units of credit for students who have completed course 137.—May

137B. Philosophy of Language: Truth and Meaning (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in philosophy or linguistics. Comparative treatment of theories about the relationship between truth and meaning. Topics include: the identification of meaning with truth conditions, the nature of propositions, theories of linguistic understanding, the roles of mind and world in determining meaning. Only two units of credit for students who have completed course 137.—Glanzberg

137C. Philosophy of Language: Semantics and Pragmatics (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in philosophy or linguistics. Philosophical issues and positions concerning the meaning and use of language. Topics include the distinction between meaning and implication, the roles of context and convention in language use, speaker meaning versus linguistic meaning and speech act theory. Only two units of credit for students who have completed course 137.—Sennet

141. Socrates and the Socratic Dialogue (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 21 recommended, or one course in philosophy, or consent of instructor. The philosophy of Socrates as found in the Socratic dialogues of Plato. Topics include the Socratic practice of refutation, its method, epistemological foundation, and moral purpose; Socratic eudaimonism and Socratic virtue theory; the paradoxes of Socratic intellectualism.—Szaif

143. Hellenistic Philosophy (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 21 recommended, or other course in philosophy. Positions and arguments of the major philosophical schools of the Hellenistic period: Stoicism, Epicureanism, and Scepticism. Focus is on ethical, epistemological and metaphysical questions and their interconnectedness.—Szaif

145. Medieval Philosophy (4)
Lecture/discussion—4 hours. Prerequisite: course 21 or other course in ancient philosophy. Major philosophers in the medieval Christian, Islamic, and Jewish traditions.—Szaif

151. Nineteenth Century European Philosophy (4)
Lecture/discussion—4 hours. Prerequisite: course 22N. Survey of the main movements in nineteenth century philosophy on the European continent. Idealism in Schopenhauer and Hegel, dialectical materialism in Marx, irrationalism in Kierkegaard, Nietzsche and Dostoevsky. Not offered every year. GE credit; ArtHum.—Mattey

156. Contemporary Analytic Philosophy (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one course in philosophy. Consideration of central issues such as meaning/reference, analytic/synthetic, reductionism, formal and ordinary language, essential properties, ontological commitment, possible world semantics; influential works by philosophers such as Russell, Moore, Wittgenstein, Austin, Carnap, Quine, Putnam, Kripke, van Fraassen.

157. Twentieth Century European Philosophy (4)
Lecture/discussion—4 hours. Prerequisite: one course in Philosophy. Survey of the main movements in twentieth century philosophy on the European continent, including phenomenology, existentialism, post-structuralism and post-modernism. Philosophers covered are Husserl, Heidegger, Sartre, Foucault, Derrida. GE credit: ArtHum.—Mattey

160. Pre-Socratics (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 21. Study of the metaphysical views of such pre-Socratic figures as the Milesians, the Pythagoreans, Heracleitus, Parmenides, Empedocles, Anaxagoras, and the atomists.

161. Plato (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 21. Examines Plato's most important contributions in metaphysics, epistemology, psychology, cosmology, ethics and political philosophy. Dialogues will be selected from Plato's middle and later writings.

162. Aristotle (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 21. An overview of Aristotle's most central and influential writings. Topics selected from fields such as metaphysics, physics, ethics, logic, and psychology.

168. Descartes (4)
Lecture/discussion—4 hours. Prerequisite: course 22N. The philosophical writings of Renè Descartes. Topics include the refutation of skepticism, the nature and existence of mind and body, the existence of God, and the foundations of science. Not offered every year.—Mattey

170. Leibniz (4)
Lecture/discussion—4 hours. Prerequisite: course 22N. Survey of the philosophical writings of Gottfried Wilhelm Leibniz. Topics include Leibniz's logic, the existence of God, human freedom, substance, and the relation between science and metaphysics. Not offered every year.—Mattey

172. Locke and Berkeley (4)
Lecture/discussion—4 hours. Prerequisite: course 22N. Principal metaphysical works of John Locke and George Berkeley. Topics include abstract ideas, existence of matter, primary and secondary qualities, essence, substance, the existence of God, and the nature of scientific knowledge. May be repeated for credit. Not offered every year.—Mattey

174. Hume (4)
Lecture/discussion—4 hours. Prerequisite: course 22N. David Hume's *Treatise of Human Nature* and related writings. Topics include empiricism, space, causality, belief, skepticism, the passions, and morality. Not offered every year.—Mattey

175. Kant (4)
Lecture/discussion—4 hours. Prerequisite: course 22N. Immanuel Kant's *Critique of Pure Reason* and related writings. Topics include the nature of human cognition, space and time, *a priori* concepts, substance, causality, human freedom, and the existence of God. Not offered every year.—Mattey

178. Frege (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: one upper-division course in philosophy or permission of instructor. Development of Gottlob Frege's views about language and logic. Formulation of his grand mathematical idea known as logicism and how it led to the philosophy of language.—II. May

189A-K. Special Topics in Philosophy (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: one course in the area of the special topic. Special topics in (A) History of Philosophy, (B) Metaphysics, (C) Theory of Knowledge, (D) Ethics, (E) Political Philosophy, (F) Philosophy of Law, (G) Aesthetics, (H) Philosophy of Mind, (I) Philosophy of Science, (J) Philosophy of Language, (K) Logic. May be repeated up to eight units of credit. Not offered every year.

194HA-194HB. Honors Research Project (4-4)
Tutoring—3 hours; term paper. Prerequisite: consent of instructor; open to students who are members of the honors program in Philosophy. Completion of honors research project under direction of an instructor. Consult departmental major adviser for list of instructors available in a given quarter.

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor.
(P/NP grading only.)

Graduate Courses

200A. Proseminar I (4)
Seminar—3 hours; term paper. Prerequisite: consent of instructor; open only to students in their first quarter of the Philosophy Ph.D. program. Intensive study of core works in a selected area of philosophy. Intensive experience in philosophical writing, discussion, and presentation of written work.—I. (I.)

200B. Proseminar II (4)
Seminar—3 hours; term paper. Prerequisite: consent of instructor; only for students in their first quarter of Philosophy Ph.D. program. Intensive study of core works in a selected area of philosophy. Intensive experience in philosophical writing, discussion, and presentation of written work. Limited enrollment.—I. (I.)

201. Metaphysics (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics vary from quarter to quarter and may include the following: What are things? Do names refer to things? If so, how? Do things have essential properties? What is the nature of necessity? May be repeated for credit when topic differs and with consent of instructor.—Gilmore

202. Theory of Knowledge (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Topics vary from quarter to quarter. Sample topics include belief, skepticism, justification, externalism, naturalized epistemology. May be repeated for credit with consent of instructor.—Mattey

203. Philosophy of Mind (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the philosophy of mind such as the mind-body problem, mental representation, consciousness, intentionality. May be repeated for credit with consent of instructor.—Molyneux

203P. Philosophy of Mind Practicum (4)
Practicum—12 hours. Prerequisite: consent of instructor. Specific research conducted and prepared for publication by advanced students in a team setting. Topics include knowledge representation and learning in neural networks, the nature and formal properties of mental representation. May be repeated for credit when topic differs and with consent of instructor. (S/U grading only.)

207. Philosophy of Physics (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing in Philosophy or consent of instructor. Intensive treatment of one (or more) topic(s) in the philosophy of physics, such as foundations of space-time theories, the interpretation of quantum mechanics, or foundations of statistical mechanics. May be repeated for credit when topic differs and with consent of instructor.

208. Philosophy of Biology (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Intensive treatment of one (or more) topic(s) in the philosophy of biology, such as foundations of evolutionary theories, reductionism in biology, sociobiology and cultural evolution. May be repeated for credit when topic differs and with consent of instructor.—Griesemer, Millstein

210. Philosophy of Science (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Treatment of one or more general topics of current interest in philosophy of science. Topics may include scientific explanation, theories of confirmation, scientific realism, reduction in physics and biology. May be repeated for credit when topic differs and with consent of instructor.—-Griesemer, Landry, Millstein

212. Philosophy of Logic and Mathematics (4)
Seminar—3 hours; term paper. Prerequisite: course 112 or 113 or Mathematics 108 or 125 or the equivalent. Philosophical issues in logic and math. Topics may include nature of logical and mathematical truth or knowledge, correctness of logical systems, foundations of mathematics, metaphysical and epistemological presuppositions, applications to philosophical problems and formalization of philosophical theories. May be repeated for credit when topic differs and with consent of instructor.—Glanzberg—Antonelli, Glanzberg, Landry

213. Advanced Logic for Graduate Students (4)
Lecture/discussion—3 hours; extensive problem solving. Prerequisite: graduate standing in Philosophy; enrollment in the Philosophy Ph.D. program. Intensive study of advanced logic, including set theory, metatheory of predicate logic, and modal logic.—I. (I.) Antonelli

214. Ethics (4)
Seminar—3 hours; term paper Prerequisite: graduate standing in philosophy or consent of instructor. Topics may include morality and motivation, objectivity in ethics, the relationship between the factual and the moral. Topics vary from quarter to quarter. May be repeated for credit when topic differs and with consent of instructor.—Copp, Dworkin, Oshana

217. Political Philosophy (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Advanced studies in political philosophy. Topics vary but may include distributive justice, enforcement of morality by the state, equality, obligation to obey the law, social contract theory. May be repeated for credit when topic differs and with consent of instructor.—Glanzberg, May, Sennet

237. Philosophy of Language (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of philosophical issues raised by language, such as the nature of semantic content, proper semantics for verbs of propositional attitude, feasibility and limitations of formal semantics and pragmatics for natural languages. May be repeated for credit when topic differs and with consent of instructor.—Glanzberg, Jackson, May, Sennet

238. Philosophy of Language Workshop (4)
Seminar—3 hours; extensive writing. Discussion of recently published, unpublished and in-progress research in philosophy of language, including work on the relation of language and mind, of language and logic, and linguistic theory. Open to graduate students only. May be repeated for credit when topic differs.—May

261. Plato (4)
Seminar—3 hours; term paper. Prerequisite; graduate standing or consent of instructor. Advanced seminar designed for analysis of arguments, doctrines, and texts from Plato's works. Methods of argumentation and interpretation are especially stressed. Topics vary according to instructor. May be repeated for credit with consent of instructor.—Szaif

262. Aristotle (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Advanced seminar designed for analysis of arguments, doctrines, and texts from Aristotle's works. Methods of argumentation and interpretation are especially stressed. Topics vary according to instructor. May be repeated for credit with consent of instructor.—Szaif

275. Kant (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Intensive study of a topic in the philosophy of Kant, in such areas as metaphysics, theory of knowledge, ethics. May be repeated for credit with consent of instructor.—Mattey

290. History of Philosophy (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the history of philosophy. Topics vary according to instructor from quarter to quarter. May be repeated for credit when topic differs and with consent of instructor.—Szaif

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Physical Education

(College of Letters and Science)

W.J. Weidner, Ph.D, Program Director

Program Office. 264 Hickey Gymnasium
(530) 752-1111

Committee in Charge

G. Robert Biggs, B.A. *(Physical Education)*
Stephen T. Bronzan, M.S. *(Physical Education)*
Barbara A. Jahn, M.S. *(Physical Education)*
Susan Kauzlarich, Ph.D. *(Chemistry)*
Academic Senate Distinguished Graduate Mentoring Award
Kevin Salyer, Ph.D. *(Economics)*
Deanne M. Vochatzer, M.A. *(Physical Education)*
Jon E. Vochatzer, M.S. *(Physical Education)*
W.J. Weidner, Ph.D. *(Neurobiology, Physiology, and Behavior)*

Faculty

G. Robert Biggs, B.A., Supervisor
Barbara A. Jahn, M.S., Supervisor
Deanne M. Vochatzer, M.A., Supervisor
Jon E. Vochatzer, M.S., Supervisor

Affiliated Faculty

Carissa Adams, Ph.D., Lecturer/Coach
Alex Antipa, B.S., Lecturer
Stephen T. Bronzan, M.S., Lecturer/Coach
Sarah Caldwell, B.S., Lecturer/Coach
Greg Chapla, B.A., Lecturer/Coach
Rozanne DeWeese, M.A., Lecturer/Coach
Steven Doten, Ph.D., Lecturer/Coach
Henry Fastenau, Lecturer
Tim Fua, B.S., Lecturer/Coach
Adam Getchell, M.S., Lecturer
Yajun Graves, B.S., Lecturer
Jennifer Gross, B.A., Lecturer/Coach
Rick Henderson, B.S., Lecturer/Coach
Jeff Hogan, B.A., Supervising Athletic Trainer/Lecturer
Mark Johnson, M.S., Lecturer/Coach
Elaine Jones, M.S., Lecturer/Coach
Andrea Khoo, B.S., Lecturer
Dominique Lastrapes, B.S., Lecturer/Coach
John Lavallee, M.Ed., Lecturer/Coach
Daryl Lee, M.S., Lecturer/Coach
Ron Manara, B.A., Lecturer/Coach
Rebecca Mason, B.S., Lecturer
Bill Maze, M.B.A., Lecturer/Coach
Eric Mild, M.S., Lecturer/Coach
Mike Moroski, M.A., Lecturer/Coach
Peter Motekaitis, M.A., Lecturer/Coach
Kevin Nosek, M.S., Lecturer/Coach
Gerald Nunes, B.S., Lecturer
Greg Ortiz, B.A., Lecturer
Rex Peters, M.S., Lecturer/Coach
Jill Radzinski, M.A., Athletic Trainer/Lecturer
Maryclaire Robinson, M.S., Lecturer/Coach
Dwayne Shaffer, M.A., Lecturer/Coach
Sandy Simpson, B.A., Lecturer/Coach
Gary Stewart, M.A., Lecturer/Coach
Byron Talley, M.A., Lecturer/Coach
Lisa Varnum, B.S., Athletic Trainer/Lecturer
Matt Vaughn, M.A., Lecturer/Coach
Cy Williams, M.A.T., Lecturer/Coach
Jamey Wright, M.S., Lecturer/Coach
Karen Yoder, M.A., Lecturer/Coach
Lennie Zalesky, M.A., Lecturer/Coach

The Program of Study

The Program in Physical Education facilitates the development and offering of non-major courses related to physical activities and education, fitness and health, athletic training, teacher education, and organized sport. The Program is available as part of a student's general educational experience to enhance and broaden the understanding and experience of physical activity in the maintenance of lifetime health and fitness.

The basic activities series includes Physical Education 1, fitness, lifetime, and sports skills. The PE 1 activity courses are instructional in nature, designed to introduce new skills to beginners or to improve existing skills. Physical Education 6 is offered for students participating in intercollegiate athletics. Additional lower division courses include those in special skill areas, such as life-saving and water safety, scuba diving, health and fitness, and athletic training. Upper division courses include advanced classes in coaching, sociology of sports, advanced skills in scuba diving, and a series of courses that meet the mandated requirements for students pursuing teacher preparation and certification.

Teaching Credential Subject Representative. W.J. Weidner

Class and Recreational Use of Facilities. The incidental fee payable by all students at the time of registration entitles students to the use of the gymnasium, pool, showers, towels, lockers, tennis courts, and athletic fields. Equipment for games and sports are available for classes. Lockers must be turned in on the last day of class, i.e., before the final examination period. Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the program.

Courses in Physical Education (PHE)

Lower Division Courses

1. Physical Activities (0.5)
Laboratory—2 hours. Sections in: (a) sports skills, rules and strategy; (b) physical fitness and personal health; (c) recreation; (d) aerobic dance. May be repeated along with course 6 for a combined total of 6 units. (P/NP grading only.)—I, II, III. (I, II, III.)

6. Preparation and Participation in ICA Competition (1)
Discussion/laboratory—10-20 hours. Prerequisite: consent of instructor (coach). Preparation and participation in Intercollegiate Athletics. Development of fundamental and advanced individual and team skills. In-depth knowledge of rules and strategy.

Advanced sports competition and Conference and NCAA levels. May be repeated along with course 1 for a combined total of 6 units. (P/NP grading only.)—I, II, III. (I, II, III.)

7. Professional Physical Education Activities: Men and Women (1)
Lecture—1 hour; or laboratory—2 hours. Fundamental skills for: (a) coaching competitive athletics; (b) classroom teaching and coaching, and (c) classroom teaching and officiating. May be repeated for a total of six units.—I, II. (I, II.)

8. Student-Athlete Life Skills (1)
Lecture—1 hour. For student-athletes. Balancing academic and athletic demands. Academic, psychological, and sociocultural issues which influence success as a college student-athlete. May be repeated up to 3 times for credit. (P/NP grading only.)—I, II. (I, II.)

15. Administration of Intramural Sports (2)
Lecture—2 hours. Planning and administering intramural sports programs at the high school and college level.

25. Theory of Lifesaving and Water Safety (2)
Lecture—1 hour; laboratory—2 hours. Prerequisite: sound physical condition, and no physical handicap that would render student unable to perform the required skills and ability to pass preliminary swimming test. Provides the student with the knowledge, organizational procedures, and skill development necessary to provide for water safety and save his/her own life or the life of another in an aquatic emergency. (American Red Cross Advanced Lifesaving Certificate awarded upon successful completion of necessary requirements.)—III. (III.) Jahn

27. Training Course for Water Safety Instructors (2)
Lecture—1 hour; laboratory—2 hours. Prerequisite: advanced swimming (course 1) or consent of instructor; course 5 and current Advanced Life-Saving Certificate. Theoretical knowledge and practical experience necessary for the organization and teaching of swimming and lifesaving classes. (American Red Cross Water Safety Instructor's Certificate awarded upon successful completion of necessary requirements.)—III. (III.) Jahn

29. Basic Scuba (2)
Lecture—2 hours; laboratory—2 hours. Prerequisite: good physical condition, ability to pass preliminary swimming test. Introduction to basic knowledge required for scuba diving, function and maintenance of equipment, physics and physiology of diving, diver first aid and CPR, oceanography and marine life, and underwater communication. Pool and open water sessions available for certification. (P/NP grading only.)—I, III. (I, III.)

40. Drugs and Society (2)
Lecture—2 hours; fieldwork—2 hours total; film-viewing—5 hours total. Pharmacology, methods of use, and effects of use of psychoactive and performance-enhancing drugs. Historical overview of drug use. Identification of behavior of "at-risk" and "user" populations. (P/NP grading only.)—II, IV. (II, IV.)

44. Principles of Healthful Living (2)
Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health problems. (P/NP grading only.)—I, II, III, IV. (II, III, IV.)

92. Physical Education Internship (1-5)
Internship—3-15 hours; written project proposal and evaluation. Prerequisite: consent of instructor; enrollment dependent on availability of intern positions, with priority given to Exercise Biology majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for credit once but no internship units will be counted toward Exercise Biology major. (P/NP grading only.)

97T. Tutoring in Physical Education (1-5)
Tutorial—1-5 hours. Prerequisite: lower division standing and consent of Program Director. Tutoring of students in lower division physical activity courses. Weekly meetings with instructor in charge of courses. Written reports on methods and materials required. May be repeated one time for credit. (P/NP grading only.)

97TC. Tutoring in the Community (1-5)
Tutorial—2-15 hours; discussion—1 hour. Prerequisite: lower division standing and consent of Program Director. Tutoring in the community in physical activity related projects under the guidance of the Physical Education faculty. Regular meetings with instructor in charge and written report required. May be repeated one time for credit. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor and Program Director. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

100. Field Experience in Teaching Physical Education (2)
Discussion—1 hour; fieldwork—4 hours. Prerequisite: upper division standing and appropriate course 1 or 7. Tutoring or teacher's aide in physical education activities, including athletic coaching, in public schools under the guidance of a regular teacher with supervision by a departmental faculty person. May be repeated one time for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

120. Sport in American Society (3)
Lecture—3 hours. Sociological approaches to the study of sport and contemporary American culture, including sport interaction with politics, economics, religion, gender, race, media and ethics. Socialization factors involving youth, scholastic, collegiate, and Olympic sport. (Same course as Exercise Biology 120.) GE credit: SocSci, Div.—II, IV. (II, IV.) Salitsky

128A. Intermediate Scuba Diving (4)
Lecture—3 hours; laboratory—3 hours; fieldwork—2 hours. Prerequisite: course 29 and consent of instructor. Lectures and practice in diver safety, rescue, accident management and patient care. Pool and open water sessions required for certification. (P/NP grading only.)—I, IV. (I, IV.) Salitsky

128B. Research Diving Techniques (4)
Lecture—3 hours; laboratory—3 hours; fieldwork—3 hours. Prerequisite: course 128A; consent of instructor. Lectures and application on search and light salvage, night diving, research techniques, cold-water, low visibility diving, blue water, deep and altitude diving. Pool and open water sessions required for certification. (P/NP grading only.)—III. (III.) Fastenau

131. Physical Activity and the Disabled (4)
Lecture—3 hours; laboratory—3 hours. The study of the diverse and complex nature of individuals with disabilities and how they adapt to their disabilities in daily living. Integration of individuals with disabilities into the community, schools, and physical activity and recreational programs. Not open for credit to students who have completed Exercise Biology 131.

133. Prevention and Care of Sports Injuries (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: Cell Biology and Human Anatomy 101 (may be taken concurrently). Prevention, care, and rehabilitation of injuries incurred by athletes. Laboratory on anatomy, emergency care, physical therapy methods, and taping techniques. Not open for credit to students who have completed Exercise Biology 133.—IV. (IV.)

135. Advanced Procedures in Evaluation and Management of Athletic Injuries (3)
Lecture—3 hours. Prerequisite: course 133 or Exercise Biology 133, Cell Biology and Human Anatomy 101, consent of instructor. Advanced study of the evaluation and management of athletic injuries, including mechanism of injury, biomechanics and pathophysiology. Current topics in athletic training. Not open for credit to students who have completed Exercise Biology 135.

142. Physical Education in the Public Schools (3)
Lecture—3 hours. Analysis and study of the principles and methods basic to teaching physical education at the elementary and secondary levels.—S. Williams

143. Coaching Effectiveness (3)
Lecture—3 hours. Prerequisite: upper division standing; 3 units of courses 1 and 6 combined. Synthesis and application of basic components of sport psychology, sport pedagogy, and sport physiology and basic management and administration of athletics in public high schools. (P/NP grading only.)—I, II, IV. (I, II, IV.) Bronzan

144. Principles of Health Education (2)
Lecture—2 hours. Prerequisite: course 44 and upper division standing or consent of instructor. Principles of teaching health education in the public schools. (P/NP grading only.)

150. Recreation in the Community (3)
Lecture—2 hours; discussion—1 hour; two Saturday field trips—8 hours. The nature and scope of community recreation programs in California emphasizing low income, highly populated areas, and poor rural communities.

192. Physical Education Internship (1-12)
Internship—3-36 hours; written project proposal and evaluation. Prerequisite: upper division standing and consent of instructor; enrollment dependent on availability of intern positions, with priority given to Exercise Science majors. Work experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for a total of 12 units (including course 92) but no internship units will be counted toward Exercise Science major. (P/NP grading only.)—I, II, III. (I, II, III.)

197T. Tutoring in Physical Education (1-5)
Tutorial—1-5 hours. Prerequisite: consent of chairperson. Tutoring of students in lower division physical activity courses. Written reports on methods and materials required. May be repeated one time for credit. (P/NP grading only.)

197TC. Tutoring in the Community (1-5)
Tutorial—2-15 hours; discussion—1 hour. Prerequisite: upper division standing and consent of Department Chairperson. Tutoring in the community in physical education related projects under the guidance of the Physical Education faculty. Regular meetings with instructor in charge and written report required. May be repeated one time for credit. (P/NP grading only

198. Directed Group Study (1-5)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Professional Courses

300. The Elementary Physical Education Program (2)
Lecture—1 hour; laboratory—2 hours; field trips to selected programs. Prerequisite: senior standing or credential student. Introduction to principles, theories, material, and practices of elementary school physical education program.—III. (III.)

380. Methods of Teaching Physical Education (3)
Lecture—1 hour; laboratory—6 hours. Prerequisite: course 142 and six units of course 7; or consent of instructor. The methods of teaching group and individual activities for grades K-12; program planning, class management, organization, and evaluation. (P/NP grading only.)

Physical Medicine and Rehabilitation

See Medicine, School of, on page 380.

Physics

(College of Letters and Science)

Warren Pickett, Ph.D., Chairperson of the Department

Lori Lubin, Ph.D., Vice Chairperson of the Department (Administration and Undergraduate Matters

Richard Scalettar, Ph.D., Vice Chairperson of the Department (Graduate Matters)

Department Office. 174 Physics Building (530) 752-1500; *http://www.physics.ucdavis.edu*

Faculty

Andreas J. Albrecht, Ph.D., Professor
Robert H. Becker, Ph.D., Professor
Patricia C. Boeshaar, Ph.D., Senior Lecturer
Marusa Bradac, Ph.D., Assistant Professor
Manuel Calderon de la Barca Sanchez, Ph.D., Associate Professor
Steven Carlip, Ph.D., Professor
Daniel A. Cebra, Ph.D., Professor
Hsin-Chia Cheng, Ph.D., Assistant Professor
Maxwell B. Chertok, Ph.D., Associate Professor
Shirley Chiang, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
Lawrence B. Coleman, Ph.D., Professor, *Academic Senate Distinguished Teaching Award*
John Conway, Ph.D., Professor
Linton R. Corruccini, Ph.D., Professor
Daniel L. Cox, Ph.D., Professor
James Crutchfield, Ph.D., Professor
Nicholas Curro, Ph.D., Associate Professor
Robin Erbacher, Ph.D., Associate Professor
Charles S. Fadley, Ph.D., Professor
Christopher D. Fassnacht, Ph.D., Associate Professor
Daniel Ferenc, Ph.D., Professor
Ching-Yao Fong, Ph.D., Professor
Giulia Galli, Ph.D., Professor
John F. Gunion, Ph.D., Professor
Nemanja Kaloper, Ph.D., Professor
Joseph E. Kiskis, Ph.D., Professor
Barry M. Klein, Ph.D., Professor
Lloyd E. Knox, Ph.D., Professor
Winston T. Ko, Ph.D., Professor
Kai Liu, Ph.D., Professor
Lori Lubin, Ph.D., Professor
Markus Luty, Ph.D., Professor
David E. Pellett, Ph.D., Professor
Warren E. Pickett, Ph.D., Professor
David Pines, Ph.D., Professor
John B. Rundle, Ph.D., Professor
Sergey Savrasov, Ph.D., Professor
Richard T. Scalettar, Ph.D., Professor
Rajiv R.P. Singh, Ph.D., Professor
Robert Svoboda, Ph.D., Professor
John Terning, Ph.D., Professor
S. Mani Tripathi, Ph.D., Professor
J. Anthony Tyson, Ph.D., Professor
David J. Webb, Ph.D., Senior Lecturer
David Wittman, Ph.D., Assistant Professor
Dong Yu, Ph.D., Assistant Professor
Xiangdong Zhu, Ph.D., Professor
Rena J. Zieve, Ph.D., Professor
Gergely Zimanyi, Ph.D., Professor

Emeriti Faculty

Franklin P. Brady, Ph.D., Professor Emeritus
Thomas A. Cahill, Ph.D., Professor Emeritus
Ling-Lie Chau, Ph.D., Professor Emerita
James E. Draper, Ph.D., Professor Emeritus
Glen W. Erickson, Ph.D., Professor Emeritus
Claude Garrod, Ph.D., Professor Emeritus
James P. Hurley, Ph.D., Professor Emeritus
John A. Jungerman, Ph.D., Professor Emeritus
William J. Knox, Ph.D., Professor Emeritus
Richard L. Lander, Ph.D., Professor Emeritus
Douglas W. McColm, Ph.D., Senior Lecturer Emeritus, *Academic Senate Distinguished Teaching Award*
Neal Peek, Ph.D., Senior Lecturer Emeritus
Wendell H. Potter, Ph.D., Senior Lecturer Emeritus, *Academic Senate Distinguished Teaching Award*
Roderick V. Reid, Jr., Ph.D., Professor Emeritus
Philip M. Yager, Ph.D., Professor Emeritus

Affiliated Faculty

Rodney W. Cole, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*
Randy R. Harris, Ph.D., Lecturer, *Academic Federation Excellence in Teaching Award*
Eckart Lorenz, Ph.D., Adjunct Professor
Harry B. Radousky, Ph.D., Adjunct Professor
Ramona Vogt, Ph.D., Adjunct Professor

The Major Program

From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of physics is the study of what makes the universe work. Information learned from high-energy particle atomic-scale microscopes and high-energy particle accelerators and nuclear reactors teaches us not only what holds the nucleus atom and the atom nucleus together but also how proteins function and why stars shine.

The Program. The Department of Physics offers a Bachelor of Arts in Physics and two Bachelor of Science degree programs: in Physics (which also offers an emphasis in Astrophysics), and in Applied Physics. The A.B. degree provides a broad coverage of classical and modern physics while permitting a broader liberal arts education than is possible with the other two programs. The B.S. degree in either Physics or Applied Physics should be followed by the student who plans to enter physics as a profession. The B.S. in Applied Physics provides the student with a solid introduction to a particular applied physics specialty. For the student who plans to enter the job market on completing a B.S. degree, the applied physics orientation would be an asset. Either B.S. program provides a solid foundation in physics for the student interested in graduate work in either pure or applied physics.

Career Alternatives. Careers in physics and applied physics include research and development, either in universities, government laboratories, or industry; teaching in high schools, junior colleges, and universities; management and administration in industrial laboratories and in government agencies; and in production and sales in industry. A major in physics also provides a strong base for graduate-level work in such interdisciplinary areas as chemical physics, biophysics and medical physics, geophysics and environmental physics, astrophysics and astronomy, computer science, and materials science.

Physics

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**41-47**
Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC, 9HD, 9HE	19-25
Mathematics 21A, 21B, 21C, 21D, 22A, 22B	22
Depth Subject Matter	**35-37**
Physics 104A, 105A, 110A, 110B, 112, 115A, 122	28
At least one course from 129A, 130A, 140A, 151, 152, or 153	4
Physics 102 (1 unit) waived if 104B taken	0-1
At least one additional fixed-unit upper division Physics course excluding 160	3-4
Total Units for the Major	**76-84**

B.S. Major Requirements:

	UNITS
Preparatory Subject Matter	**50-56**
Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC, 9HD, 9HE	19-25
Mathematics 21A, 21B, 21C, 21D, 22A, 22B	22
Computer Science Engineering 30 (or equivalent programming course)	4
Chemistry 2A or 2HA (2B-2C or 2HB-2HC highly recommended)	5
Depth Subject Matter	**59-62**
Physics 104A, 105A, 105B, 110A, 110B, 110C, 112, 115A, 115B	36
Physics 102 (1 unit) or 104B	1-4
Physics 122 or 116A, B and C	4-12
Two courses from one specialty (General Relativity/Astrophysical Applications, Condensed Matter, or Nuclear/Particle Physics) and one course from a different specialty. Lists of courses in each specialty are available from the department	12
Additional upper division Physics courses excluding 160, for a total of 15 upper division Physics courses of 3 or more units each. With prior departmental approval, one course from mathematics, engineering, or natural science may be used to meet this requirement. May include only one course from 194H, 195, 198, 199	0-9
Total Units for the Major	**109-118**

Astrophysics Emphasis

	UNITS
Preparatory Subject Matter	**50-56**
Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC, 9HD, 9HE	19-25
Mathematics 21A, 21B, 21C, 21D, 22A, 22B	22
Computer Science Engineering 30 (or equivalent programming course)	4
Chemistry 2A or 2HA (2B-2C or 2HB-2HC highly recommended)	5
Depth Subject Matter	**59-65**
Physics 104A, 105A, 108L, 110A, 110B, 112, 115A, 115B,	32
Physics 102 or 104B	1-4
Physics 122 or 157	4
Physics 151, 152, 153, 156	16
Two elective courses from: Physics 105B, 110C, 116A, 129A, 130A, 130B, 150 (only with an astrophysics topic and prior departmental approval), 154, 155, Geology 163; may include only one course from Physics 194H, 195, or 199	6-9
Total Units for the Major	**109-121**

Recommended

Computer Science Engineering 40; Astronomy 25

Applied Physics

B.S. Major Requirements:

	UNITS
Preparatory Subject Matter	**49-56**
Physics 9A, 9B, 9C, 9D or 9HA, 9HB, 9HC, 9HD, 9HE	19-25
Mathematics 21A, 21B, 21C, 21D, 22A, 22B	22
Computer Science Engineering 30 (or equivalent programming course)	4
Depending on area of concentration: Chemistry 2A or 2HA (2B-2C or 2HB-2HC highly recommended) or Computer Science Engineering 40 or Mathematics 22AL	14-5
Depth Subject Matter	**57-64**
Physics 104A, 105A, 110A, 110B, 112, 115A, 116A, 116B	32
Physics 102 (1 unit) or 104B	1-4

Physics 122 or 116 C.....4
Further courses from approved lists within one of the following concentrations chosen in consultation with a major adviser, to bring total number of three to five unit Depth courses to 15..... 20-24
Lists of approved courses for concentrations in atmospheric physics, chemical physics, computational physics, geophysics, materials science, physical electronics, and physical oceanography are available from the Physics Department.

Total Units for the Major..... 106-121

Recommended Electives

Astronomy: Astronomy 25
Computer and numerical analysis: Mathematics 128A or Applied Science Engineering 115
Statistics: Statistics 131A
Advanced mathematics: Mathematics 108, 118AB, 119AB 127ABC 185AB

Program Variance. Courses from other departments may be submitted for courses in the depth subject matter requirements by obtaining written permission from the Undergraduate Curriculum Committee Chairperson, as approved by the Department.

Major Advisers. Contact Departmental Undergraduate Majors office in 174 Physics Building, for adviser assignment.

Minor Program Requirements:

All courses in the minor have prerequisites equivalent to Mathematics 21A-21B-21C-21D and 22A-22B and Physics 9A-9B-9C-9D. Students considering the possibility of a minor should consult with a Physics major advisor before beginning course work in the minor program.

UNITS

Physics..... 24

At least 6 upper division courses in Physics (excluding Physics 160, 197T and 199) 24

Graduate Study. The Department of Physics offers programs of study and research leading to the M.S. and Ph.D. degrees. Further information regarding requirements for these three degrees, graduate research, teaching assistantships, and research assistantships may be obtained by writing to the Chairperson, Department of Physics, One Shields Avenue, University of California, Davis, CA 95616.

Astronomy. In addition to the introductory Astronomy courses listed, upper division and graduate courses in Astronomy, Astrophysics and Cosmology are listed under Physics.

Courses in Astronomy (AST)

Lower Division Courses

10G. Introduction to Stars, Galaxies, and the Universe (3)

Lecture—3 hours. Non-mathematical introduction to astrophysics of the Universe beyond our solar system using concepts of modern physics. Not open for credit to students who have taken Astronomy 2, the former Astronomy 10, any quarter of Physics 9 or 9H, or any upper-division physics course (other than 137 or 160). GE credit: SciEng.—I, III. (I, III.)

10L. Observational Astronomy Laboratory (1)

Laboratory—2.5 hours. Prerequisite: course 10G or 10S (may be taken concurrently). Introduction to observations of the night sky using small telescopes in nighttime laboratory. Not open for credit to students who have completed course 2 or 10. GE Credit: SciEng.—I, III. (I, III.)

10S. Astronomy of the Solar System (3)

Lecture—3 hours. Introduction to naked eye and telescopic observations of events in the night sky: positions of sun, moon, planets throughout the year. Historical perspective on how our understanding of the solar system evolved to current non-mathematical astrophysical interpretation of planetary systems. Not open for credit to students who have taken course 2, Physics 9 or 9H, or any upper-division physics course (other than 137 or 160). GE credit: SciEng.—II, III. (II, III.)

25. Introduction to Modern Astronomy and Astrophysics (4)

Lecture—3 hours; lecture/discussion—2.5 hours. Prerequisite: good facility in high school physics and mathematics (algebra and trigonometry). Description and interpretation of astronomical phenomena using the laws of modern physics and observations by modern astronomical instruments. Gravity, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, galaxies and the universe. Not open to students who have received credit for course 2, 10G, or 10L.—I. (I.) Fassnacht, Lubin

Courses in Physics (PHY)

Physics 10 is primarily a concept-oriented one-quarter lecture/discussion course requiring relatively little mathematical background.

Physics 1 is a two-quarter sequence requiring some mathematics (trigonometry). Either 1A alone or both quarters may be taken. The sequence is not intended to satisfy entrance requirements of a year of physics for professional schools, but will satisfy requirements of 3 or 6 units of physics.

Physics 7 is a one-year (three-quarter) introductory physics course with laboratory intended for students majoring in the biological sciences. It has a calculus prerequisite. If you don't need a full year of introductory physics, you should take one or two quarters of Physics 1 instead. Read the following information carefully if you are using Physics 7 to complete an introductory course you have already begun.

The sequence of material in Physics 7 is different from that in most traditionally taught introductory physics courses. Physics 7B is most like the first quarter or semester of traditionally taught courses which treat classical mechanics. Physics 7C is most like the last quarter or semester which, in traditionally taught courses, treats optics, electricity and magnetism, and modern physics. The content and sequence of Physics 7A is unlike that of most other traditionally taught courses.

If you have completed one introductory quarter or semester of a traditionally taught physics course and want to continue with Physics 7, you should first take (and will receive full credit for) Physics 7A.Then, either skip 7B, but self-study the last three weeks of material, or take 7B and receive reduced credit. Next, take 7C for full credit.

If you have taken two quarters of a year-long introductory physics course and have not had extensive work in optics, electricity and magnetism, and modern physics, you should take Physics 7C. In no case should you take Physics 7B without first taking Physics 7A. All other situations should be discussed directly with a Physics 7 instructor.

Students not intending to take the entire sequence should take Physics 1.

Physics 9 is a four-quarter sequence using calculus throughout and including laboratory work as an integral part. The course is primarily for students in the physical sciences and engineering.

Physics 9H is a five-quarter honors physics sequence, which may be taken instead of Physics 9. It is intended primarily for first-year students with a strong interest in physics and with advanced placement in mathematics. In course requirements and prerequisites, Physics 9HA-9HE can be substituted for Physics 9A-9D. You may not switch between the 9H and 9 series beyond 9HA or 9A.

Lower Division Courses

1A. Principles of Physics (3)

Lecture—3 hours. Prerequisite: trigonometry or consent of instructor. Mechanics. Introduction to general principles and analytical methods used in physics with emphasis on applications in applied agricultural and biological sciences and in physical education. Not open to students who have received credit for course 7B, or 9A.—I. (I.)

1B. Principles of Physics (3)

Lecture—3 hours. Prerequisite: course 1A or 9A. Continuation of course 1A. Heat, optics, electricity, modern physics. Not open for credit to students who have received credit for course 7A, 7B, 7C, 9B, 9C, or 9D.—II. (II.)

7A. General Physics (4)

Lecture—1.5 hours; discussion/laboratory—5 hours. Prerequisite: completion or concurrent enrollment in Mathematics 16B, 17B, or 21B. Introduction to general principles and analytical methods used in physics for students majoring in a biological science. Only two units of credit allowed to students who have completed course 1B or 9B.—I, II, III. (I, II, III.)

7B. General Physics (4)

Lecture—1.5 hours; discussion/laboratory—5 hours. Prerequisite: course 7A. Continuation of course 7A. Only two units of credit allowed to students who have completed course 9A, or 1A.—I, II, III. (I, II, III.)

7C. General Physics (4)

Lecture—1.5 hours; discussion/laboratory—5 hours. Prerequisite: course 7B. Continuation of course 7B. Only two units of credit allowed to students who have completed course 9C or 5C.—I, II, III. (I, II, III.)

9A. Classical Physics (5)

Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: Mathematics 21B. Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Classical mechanics. Only 2 units of credit to students who have completed course 1A or 7B. Not open for credit to students who have completed course 9HA.—I, III. (I, III.)

9B. Classical Physics (5)

Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite: course 9A, Mathematics 21C, 21D (may be taken concurrently). Continuation of course 9A. Fluid mechanics, thermodynamics, wave phenomena, optics. Only 2 units of credit to students who have completed course 7A. Not open for credit to students who have completed course 9HB, 9HC, or Engineering 105.—I, II. (I, II.)

9C. Classical Physics (5)

Lecture—3 hours; laboratory—2.5 hours; discussion—1 hour. Prerequisite; course 9B, Mathematics 21D, 22A (may be taken concurrently). Electricity and magnetism including circuits and Maxwell's equations. Only 3 units of credit to students who have completed course 7C. Not open for credit to students who have completed course 9HD.—II, III. (II, III.)

9D. Modern Physics (4)

Lecture—3 hours; discussion—1.5 hours. Prerequisite: course 9C and Mathematics 22A; Mathematics 22B recommended (may be taken concurrently). Introduction to physics concepts developed since 1900. Special relativity, quantum mechanics, atoms, molecules, condensed matter, nuclear and particle physics. Not open for credit to students who have completed course 9HB, 9HC, or 9HE.—I, III. (I, III.)

9HA. Honors Physics (5)

Lecture—3 hours; discussion/laboratory—4 hours. Prerequisite: Mathematics 21B (may be taken concurrently) or consent of instructor. Classical mechanics. Same material as course 9A in greater depth. For students in physical sciences, mathematics, and engineering. Only 2 units of credit to students who have completed course 7B. Not open for credit to students who have completed course 9A.—I. (I.)

9HB. Honors Physics (5)

Lecture—3 hours; discussion/laboratory—4 hours. Prerequisite: Physics 9HA or 9A, Mathematics 21C (may be taken concurrently). Special relativity, thermal physics. Continuation of course 9HA. Only 2 units of credit to students who have completed course 7A. Not open for credit to students who have completed course 9B or 9D.—II. (II.)

9HC. Honors Physics (5)
Lecture—3 hours; discussion/laboratory—4 hours. Prerequisite: course 9HB and Mathematics 21D (may be taken concurrently). Waves, sound, optics, quantum physics. Continuation of Physics 9HB. Only 2 units of credit to students who have completed course 7C. Not open for credit to students who have completed course 9B or 9D.—III. (III.)

9HD. Honors Physics (5)
Lecture—3 hours; discussion/laboratory—4 hours. Prerequisite: course 9HC and Mathematics 21D. Electricity and magnetism. Continuation of Physics 9HC. Not open for credit to students who have completed course 9C.—I. (I.)

9HE. Honors Physics (5)
Lecture—3 hours; discussion/laboratory—4 hours. Prerequisite: course 9HD and Mathematics 22B (may be taken concurrently). Application of quantum mechanics. Not open for credit to students who have completed course 9D.—II. (II.)

10. Topics in Physics for Nonscientists (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Emphasis varies: survey of basic principles or a deeper exploration of some particular branch. Past topics included black holes, space time, and relativity; physics of music; history and philosophy; energy and the environment; and natural phenomena. Check with the Department office for the current emphasis. No units of credit allowed if taken after any other physics course. GE credit: SciEng, Wrt.

30. Fractals, Chaos and Complexity (3)
Lecture/discussion—3 hours. Prerequisite: Mathematics 16A or 21A. Modern ideas about the unifying ideas of fractal geometry, chaos and complexity. Basic theory and applications with examples from physics, earth sciences, mathematics, population dynamics, ecology, history, economics, biology, computer science, art and architecture. Offered in alternate years. (Same course as Geology 30.) GE Credit: SciEng.—(II.) Rundle

49. Supplementary Work in Lower Division Physics (1-3)
Students with partial credit in lower division physics courses may, with consent of instructor, complete the credit under this heading. May be repeated for credit.—I, II, III. (I, II, III.)

90X. Lower Division Seminar (2)
Seminar—2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Physics through shared readings, discussions, written assignments, or special activities such as laboratory work. May be repeated for credit. Limited enrollment.

98. Directed Group Study (1-5)
Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

102. Computational Laboratory in Physics (1)
Laboratory—4 hours. Prerequisite: Mathematics 21D, 22AB; Computer Science Engineering 30; course 9D or 9HD; course 104A concurrently. Introduction to computational physics and to the computational resources in the physics department. Preparation for brief programming assignments required in other upper division physics classes. Not open to students who have completed course 104B or 105AL.—I. (I.) Fong

104A. Introductory Methods of Mathematical Physics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B with grade C- or better or consent of instructor. Introduction to the mathematics used in upper-division physics courses, including applications of vector spaces, Fourier analysis, partial differential equations.—I. (I.)

104B. Computational Methods of Mathematical Physics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 104A with grade C- or better and course 105AL or consent of instructor. Introduction to the use of computational techniques to solve the mathematical problems that arise in advanced physics courses, complementing the analytical approaches emphasized in course 104A.—II. (II.)

104C. Intermediate Methods of Mathematical Physics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 104A with grade C- or better or consent of instructor. Applications of complex analysis, conditional probability, integral transformations and other advanced topics. Not offered every year.—III. (III.)

105A-105B. Analytical Mechanics (4-4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B passed with grade C– or better; or consent of department; course 104A and 105A passed with a grade C– or better or consent of department required for 105B. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations.—I-II. (I-II.)

105C. Continuum Mechanics (4)
Lecture—3 hours. Prerequisite: 104A and 105A passed with a grade of C- or better, or consent of department. The continuum hypothesis and limitations, tensors, isotropic constitutive equations, and wave propagation. Applications such as elastic solids, heat flow, aerodynamics, and ocean waves. Not offered every year.

108. Optics (3)
Lecture—3 hours. Prerequisite: course 9 or 7 sequence and Mathematics 21 sequence or consent of instructor. The phenomena of diffraction, interference, and polarization of light, with applications to current problems in astrophysics, material science, and atmospheric science. Study of modern optical instrumentation. Open to non-majors.—III. (III.)

108L. Optics Laboratory (1)
Laboratory—3 hours. Prerequisite: course 108 concurrently. The laboratory will consist of one major project pursued throughout the quarter, based on modern applications of optical techniques.—III. (III.)

110A-110B-110C. Electricity and Magnetism (4-4-4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 9B, 9C, 9D and Mathematics 21D, 22A, and 22B passed with grade C– or better, or consent of department; prerequisite for 110B is courses 110A and 104A passed with a grade of C– or better or consent of department; prerequisite for course 110C is courses 110B and 104B passed with a grade of C– or better, or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves.—II-III-I. (II-III-I.)

112. Thermodynamics and Statistical Mechanics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 115A or the equivalent. Introduction to classical and quantum statistical mechanics and their connections with thermodynamics. The theory is developed for the ideal gas model and simple magnetic models and then extended to studies of solids, quantum fluids, and chemical equilibria.—I. (I.)

115A. Foundation of Quantum Mechanics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: courses 104A and 105A passed with a grade of C- or better, or consent of department. Introduction to the methods of quantum mechanics with applications to atomic, molecular, solid state, nuclear and elementary particle physics. Extensive problem solving.—III. (III.)

115B. Applications of Quantum Mechanics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 115A passed with a grade of C– of better, or consent of department. Angular momentum and spin; hydrogen atom and atomic spectra; perturbation theory; scattering theory.—I. (I.)

116A. Electronic Instrumentation (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 9C and Math 22B or consent of instructor. Experimental and theoretical study of important analog electronic circuits. Linear circuits, transmission lines, input impedance, feedback, amplifiers, oscillators, noise.—I. (I.) Pellett

116B. Electronic Instrumentation (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 9C or 9HD or consent of instructor. Continuation of course 116A. Introduction to the use of digital electronics and microcomputers in experimental physics. Nonlinear electronics, integrated circuits, analog-to-digital and digital-to-analog converters, transducers, actuators.—II. (II.) Pellett

116C. Introduction to Computer-Based Experiments in Physics (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 9D or 9HD, 116B, Mathematics 22B or consent of instructor. Introduction to techniques for making physical measurements using computer-based instrumentation.—III. (III.) Pellett

122A. Advanced Laboratory in Condensed Matter Physics (4)
Laboratory—8 hours. Prerequisite: course 115A or consent of the department. Experimental techniques and measurements in solid-state physics. Student performs three to six experiments depending on difficulty. Individual work is stressed. Thorough write-ups of the experiments are required.—II. (II.)

122B. Advanced Laboratory in Particle Physics (4)
Laboratory—8 hours. Prerequisite: course 115A or consent of the department. Experimental techniques and measurements in nuclear and particle physics. Students perform three to six experiments depending on difficulty. Individual work is stressed. Thorough write-ups of the experiments are required.—II. (II.)

123. Signals and Noise in Physics (4)
Lecture—3 hours; project—1 hour. Prerequisite: courses 9A, B, C, D and 104A, or consent of instructor. Techniques of measurement and analysis designed to avoid systematic error and maximize signal/noise ratio. Illustrative examples of optimal filters ranging from condensed matter to cosmology. Not open to students who have completed this course previously as course 198.—II. (II.) Tyson

129A. Introduction to Nuclear Physics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 115A passed with a grade of C- or better or consent of instructor. Survey of basic nuclear properties and concepts requiring introductory knowledge of quantum mechanics: nuclear models and forces, radioactive decay and detecting nuclear radiation and nuclear reaction products, alpha, beta and gamma decay.—III. (III.)

129B. Nuclear Physics, Extensions and Applications (4)
Lecture—3 hours; term paper. Prerequisite: course 129A. Continuation of course 129A. Nuclear reactions, neutrons, fission, fusion accelerators, introduction to meson and particle physics, nuclear astrophysics, and applications of nuclear physics and techniques to mass spectrometry, nuclear medicine, trace element analysis. Not offered every year.

130A-130B. Elementary Particle Physics (4-4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 115A passed with a grade of C- or better or consent of instructor. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electromagnetic, and weak interactions. Introduction to Feynman calculus. Not offered every year.—II, III. (II, III.)

140A-140B. Introduction to Solid State Physics (4-4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 115A or the equivalent passed with a grade of C- or better or consent of instructor. Survey of fundamental ideas in the physics of solids, with selected device applications. Crystal structure, x-ray and neutron diffraction, phonons, simple metals, energy bands and Fermi surfaces, semiconductors, optical properties, magnetism, superconductivity.—II-III. (II-III.)

150. Special Topics in Physics (4)
Lecture—3 hours; project. Prerequisite: courses 9A, B, C, D or 9HA, HB, HC, HD, HE or consent of instructor. Topics vary, covering areas of contemporary research in physics. May be repeated for credit. Not offered every year.—I, II, III. (I, II, III.)

151. Stellar Structure and Evolution (4)
Lecture—3 hours; project. Prerequisite: courses 9A, B, C, D or consent of instructor. The chemical composition, structure, energy sources and evolutionary history of stars, with equal emphasis on both the observational data and theoretical models, including black holes, neutron stars and white dwarfs and the formation of substellar masses. Offered in alternate years.—I. (I.) Becker, Boeshaar

152. Galactic Structure and the Interstellar Medium (4)
Lecture—3 hours; project. Prerequisite: courses 9A, B, C, D and 105A concurrently or consent of instructor.The structure, contents, and formation of our Milky Way galaxy, viz. its shape and size, the nature of the interstellar medium, stellar populations, rotation curves, mass determination and evidence of dark matter. Offered in alternate years.—I. (I.). Boeshaar, Knox

153. Extragalactic Astrophysics (4)
Lecture—3 hours; project. Prerequisite: courses 9A, B, C, D, 104A and 105A or consent of instructor. Structure and evolution of galaxies and clusters of galaxies, including distance and mass determination, galaxy types and environments, active galactic nuclei and quasars, gravitational lensing and dark matter, global cosmological properties. Not open to students who have completed course 127. Offered in alternate years.—II. (II.) Fassnacht

154. Astrophysical Applications of Physics (4)
Lecture—3 hours; project. Prerequisite: course 105AB, 110A; 110B and 115A concurrently; 112 or consent of instructor. Applications of classical and quantum mechanics, thermodynamics, statistical mechanics, and electricity and magnetism to astrophysical settings such as the Big Bang, degenerate white dwarf and neutron stars, and solar neutrinos. Not open to students who have completed this course previously as course 198. Offered in alternate years.—III. (III.) Knox

155. General Relativity (4)
Lecture—3 hours; project. Prerequisite: course 104A and 105A; 105B and 110A or consent of instructor. Definition of the mathematical frame work for the description of the gravitational field, introduction of the dynamical equations of Einstein governing its evolution and review of the key solutions, including black holes and expanding universes. Offered in alternate years.—II. (II.) Kaloper

156. Introduction to Cosmology (4)
Lecture—3 hours; project. Prerequisite: courses 9A, B, C, D and 105A concurrently or consent of instructor. Contemporary knowledge regarding the origin of the universe, including the Big Bang and nucleosynthesis, microwave background radiation, formation of cosmic structure, cosmic inflation, cosmic acceleration and dark energy. Offered in alternate years. Not open to students who have completed course 126.—III. (III.) Albrecht

157. Astronomy Instrumentation and Data Analysis Laboratory (4)
Lecture—2 hours; laboratory—6 hours; project. Prerequisite: courses 9A, B, C, D. Experimental techniques, data acquisition and analysis involving stellar, nebular and galaxy digital imaging, photometry and spectroscopy. Analyzing time resolved changes in the solar atmosphere in the light of hyrdrogen alpha. Offered in alternate years.—III. (III.) Boeshaar, Tyson

160. Environmental Physics and Society (3)
Lecture—3 hours. Prerequisite: course 9D or 7C; or course 10 or 1B and Mathematics 16B or the equivalent. Impact of humankind on the environment will be discussed from the point of view of the physical sciences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (Same course as Engineering 160.) GE credit: SciEng or SocSci.—III. (III.)

190. Careers in Physics (1)
Seminar—2 hours. Overview of important research areas in physics, discussions of research opportunities and internships, strategies for graduate school and industrial careers, the fellowship and assistantship selection process, preparation of resumes, personal statements, and letters of recommendation. Physics and Applied Physics majors only. (P/NP grading only.)—I. (I.)

194HA-194HB. Special Study for Honors Students (4-4)
Independent study—12 hours. Prerequisite: consent of instructor required. Open only to Physics and Applied Physics majors who satisfy the College of Letters and Science requirements for entrance into the Honors Program. Independent research project at a level significantly beyond that defined by the normal physics curriculum. (Deferred grading only, pending completion of sequence).

195. Senior Thesis (5)
Independent study—15 hours. Prerequisite: consent of instructor required. Open only to Physics and Applied Physics majors with senior standing. Preparation of a senior thesis on a topic selected by the student with approval of the department. May be repeated for a total of 15 units.—I, II, III. (I, II, III.)

197T. Tutoring in Physics and Astronomy (1-5)
Tutoring of students in lower division courses. Leading of small voluntary discussion groups affiliated with one of the department's regular courses. Weekly meeting with instructor. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

200A. Theory of Mechanics and Electromagnetics (4)
Lecture—3 hours; independent study—1 hour. Prerequisite: courses 104B, 105B, and 110C or the equivalent; course 204A concurrently. Theoretical approaches in classical mechanics including the use of generalized coordinates and virtual work; variational calculus; Lagrange equations; symmetries, conservation laws, and Noether theorem; Lagrangian density; Hamilton formalism; canonical transformations; Poisson brackets; and Hamilton-Jacobi equations.—I. (I.)

200B-200C. Theory of Mechanics and Electromagnetics (4-4)
Lecture—3 hours; independent study—1 hour. Prerequisite: course 200A, and course 204B concurrently. Theoretical approaches in electromagnetics including static electromagnetic fields; Maxwell's equations; plane waves in various media; magnetohydrodynamics; diffraction theory; radiating systems; and special relativity.—II-III. (II-III.)

204A-204B. Methods of Mathematical Physics (4-4)
Lecture—3 hours; independent study—1 hour. Prerequisite: courses 104A and 104B or the equivalent. Linear vector spaces, operators and their spectral analysis, complete sets of functions, complex variables, functional analysis, Green's functions, calculus of variations, introduction to numerical analysis.—I-II. (I-II.)

210. Computational Physics (3)
Lecture—3 hours. Prerequisite: knowledge of Fortran or C. Analytic techniques to solve differential equations and eignevalue problems. Physics content of course will be self-contained, and adjusted according to background of students.—II. (II.)

215A-215B-215C. Quantum Mechanics (4-4-4)
Lecture—3 hours; independent study—1 hour. Prerequisite: course 115B or the equivalent. Formal development and interpretation of non-relativistic quantum mechanics; its application to atomic, nuclear, molecular, and solid-state problems; brief introduction to relativistic quantum mechanics and the Dirac equation.—I-II-III. (I-II-III.)

219A. Statistical Mechanics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 215B or the equivalent. Foundations of thermodynamics and classical and quantum statistical mechanics with simple applications to properties of solids, real gases, nuclear matter, etc. and a brief introduction to phase transitions.—III. (III.)

219B. Statistical Mechanics (4)
Lecture—3 hours; extensive problem solving. Prerequisite: course 219A. Further applications of thermodynamics and classical and quantum statistical mechanics. The modern theory of fluctuations about the equilibrium state, phase transitions and critical phenomena.—I. (I.)

223A. Group Theoretical Methods of Physics—Condensed Matter (3)
Lecture—3 hours. Prerequisite: courses 215A, 215B (215C is corequisite) or consent of instructor. Theory of groups and their representations with applications in condensed matter. Not offered every year.

223B. Group Theoretical Methods of Physics—Elementary Particles (3)
Lecture—3 hours. Prerequisite: courses 215A, 215B (215C is corequisite) or consent of instructor. Theory of groups and their representations with applications in elementary particle physics. Not offered every year.

224A. Nuclear Physics (3)
Lecture—3 hours. Prerequisite: course 215B. Comprehensive study of the nucleon-nucleon interaction including the deuteron, nucleon-nucleon scattering, polarization, determination of real parameters of S-matrix, and related topics. Not offered every year.

224B. Nuclear Physics (3)
Lecture—3 hours. Prerequisite: course 224A. Study of nuclear models, including shell model, collective model, unified model. Energy level spectra, static momenta, and electromagnetic transition rates. Not offered every year.

224C. Nuclear Physics (3)
Lecture—3 hours. Prerequisite: course 224B. Study of nuclear scattering and reactions including the optical model and direct interactions. Beta decay and an introduction to weak interactions. Not offered every year.

229A. Advanced Nuclear Theory (3)
Lecture—3 hours. Prerequisite: course 224C. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for two-body scattering. Not offered every year.

229B. Advanced Nuclear Theory (3)
Lecture—3 hours. Prerequisite: course 229A. Advanced topics in nuclear theory; theory of quantum-mechanical scattering processes. Exact formal theory and models for three-body scattering. Not offered every year.

230A. Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization.—III. (III.)

230B. Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite: course 230A. Continuation of 230A, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations.—I. (I.)

230C. Quantum Theory of Fields (3)
Lecture—3 hours. Prerequisite: course 230A and B, or consent of instructor. Renormalization theory and applications, including dimensional regularization, Ward identities, renormalization group equations, coupling constant unification, and precision electroweak calculations. May be repeated for credit with consent of instructor.—II. (II.) Gunion

240A. Condensed Matter Physics A (3)
Lecture—3 hours. Prerequisite: course 215C, 219A; course 140AB or equivalent recommended. Topics in condensed matter physics: Crystal structure; one-electron theory; transport and optical properties of semiconductors; phonons, electron-phonon scattering.—I. (I.)

240B. Condensed Matter Physics B (3)
Lecture—3 hours. Prerequisite: course 240A. Topics in condensed matter physics: transport and optical properties of metals and quantum structures; experimental measurement the Fermi surface and of phonon spectra.—II. (II.)

240C. Condensed Matter Physics (3)
Lecture—3 hours. Prerequisite: course 240AB. Review of second quantization. Interacting electron gas, electron-phonon interaction and effects, including instabilities of electronic systems. Topics in the theory of superconductivity and magnetism.—III (III.)

241. Advanced Topics in Magnetism (3)
Lecture—3 hours. Prerequisite: courses 240A-240B and 240C-240D, or consent of instructor. Topics chosen from areas of current research interest. Not offered every year.

242. Advanced Topics in Superconductivity (3)
Lecture—3 hours. Prerequisite: courses 240A-240B and 240C-240D, or consent of instructor. Topics chosen from areas of current research interest. Not offered every year.

243A-243B-243C. Surface Physics of Materials (3-3-3)
Lecture—3 hours. Prerequisite: courses 140A-140B, 115A-115B or the equivalents; courses 215A, 240A, or the equivalents recommended. Experimental and theoretical fundamentals of surface and interface physics and chemistry, including electronic and magnetic structure, thermodynamics, adsorption kinetics, epitaxial growth, and a discussion of various spectroscopic and structural probes based on photons, electrons, ions, and scanning probes. Offered in alternate years—(I, II, III.)

245A. High-Energy Physics (3)
Lecture—3 hours. Prerequisite: course 230A. Phenomenology and systematics of strong, electromagnetic, and weak interactions of hadrons and leptons; determination of quantum numbers; quarks and quarkonia; deep inelastic scattering; the quark parton model; experiments at hadron colliders and electron-positron colliders.—II. (II.)

245B. High-Energy Physics (3)
Lecture—3 hours. Prerequisite: course 245A. Electroweak interactions; phenomenology of the Standard Model of $SU(2)_L xU(1)$; weak interaction experiments; properties of and experiments with W and Z vector bosons; Glashow-Weinberg-Salam model and the Higgs boson; introduction to supersymmetry and other speculations.—III. (III.)

245C. Collider Physics (3)
Lecture—3 hours. Prerequisite: course 245A; course 252B taken previously or concurrently; or consent of instructor. Collider physics. Topics include quark and gluon distribution functions and the computation of cross sections; Large Hadron Collider and International Linear Collider phenomenology; collider and detector characteristics; extracting models from data; software tools for analyzing experimental data. May be repeated for credit with consent of instructor.—III. (III.) Chertok

246A. Supersymmetry: Theory and Phenomenology (3)
Lecture—3 hours. Prerequisite: courses 230A-230B, 245A-245B recommended, or consent of instructor. Construction of supersymmetric models of particle physics; superfields; supersymmetry breaking the minimal supersymmetric standard model; supergravity. Collider phenomenology of supersymmetry. Dark matter phenomenology. Not offered every year.—III. (III.) Gunion

246B. Advanced Supersymmetry (3)
Lecture—3 hours. Prerequisite: course 246A. Advanced topics in supersymmetry. Topics include holomorphy, the Affleck-Dine-Seiberg superpotential, Seiberg duality for SUSY QCD, dynamical SUSY breaking, Seiberg-Witten theory, superconformal field theories, supergravity, anomaly and gaugino mediation, and the AdS/CFT correspondence. Offered in alternate years.—I. (I.) Terning

250. Special Topics in Physics (3)
Lecture—3 hours. Prerequisite: consent of instructor. Topic varies. May be repeated for credit. Not offered every quarter.—I, II, III. (I, II, III.)

252A. Techniques of Experimental Physics (3)
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from condensed matter research will be utilized. Not offered every year.

252B. Techniques of Experimental Physics (3)
Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from nuclear and particle research will be utilized.—III. (III.)

252C. Statistics and Data Analysis for Particle Physics (3)
Lecture—3 hours. Introduction to statistical data analysis methods in particle physics. Theoretical lectures combined with practical computer laboratory work.—III. (III.)

253. Signals and Noise in Physics (3)
Lecture—3 hours. Techniques for extracting signals from noise, systematic error.—II. (II.)

256. Natural Computation and Self-Organization: The Physics of Information Processing in Complex Systems (3)
Lecture—3 hours. Prerequisite: course 200A or Mathematics 119A/B or Mathematics 219; course 204A or Mathematics 119A/B or Mathematics 219; course 219A or Mathematics 135A/B or Mathematics 235A. Explores intrinsic unpredictability (deterministic chaos) and the emergence of structure in natural complex systems. Using statistical mechanics, information theory, and computation theory, the course develops a systematic framework for analyzing dynamical and stochastic processes in terms of their causal architecture.—II. (II.) Crutchfield

260. Introduction to General Relativity (3)
Lecture—3 hours. Prerequisite: courses 200A, 200B. An introduction to general relativity. Differential geometry and curved spacetime; the Einstein field equations; gravitational fields of stars and black holes; weak fields and gravitational radiation; experimental tests; Big Bang cosmology.—I. (I.)

262. Early Universe Cosmology (3)
Lecture—3 hours. Prerequisite: second year standing in Physics graduate program or consent of instructor. Introduction to early universe cosmology: the Big Bang, inflation, primordial nucleosynthesis, dark matter, dark energy, and other topics of current interest.—I. (I.)

263. Cosmic Structure Formation (3)
Lecture—3 hours. Prerequisite: course 260. Growth of structure from small density inhomogeneities in the early universe to the diverse structures observable today. Use of observable properties (cosmic microwave background, gravitational lensing, peculiar velocities, number density, etc.) to constrain models of structure formation and fundamental physics.—III. (III.)

265. High Energy Astrophysics and Radiative Processes (3)
Lecture—3 hours. Prerequisite: graduate standing in physics or consent of instructor. Survey course covering galactic and extragalactic X-ray and gamma-ray astronomy, radiative processes, and techniques of high-energy astrophysics.—I. (I.)

266. Data Analysis for Astrophysics (3)
Lecture—3 hours. Prerequisite: graduate standing in physics or consent of instructor. Survey course covering measurement and signal analysis techniques for astrophysics and cosmology throughout the electromagnetic spectrum.—II. (II.)

267. Observational Extragalactic Astronomy & Cosmology (3)
Lecture—3 hours. Prerequisite: graduate standing in physics or consent of the instructor. Survey course covering current areas of research on extragalactic objects, their physical properties, origin, evolution, and distribution in space.—III. (III.)

270. Current Topics in Physics Research (2)
Lecture/discussion—2 hours. Prerequisite: graduate standing in physics or consent of instructor. Reading and discussion to help physics graduate students develop and maintain familiarity with the current and past literature in their immediate field of research and related areas. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

280. Seminar in Ethics for Scientists (2)
Seminar—2 hours. Prerequisite: graduate standing in any department of Science or Engineering. Studies of topical and historical issues in the ethics of science, possibly including issues such as proper authorship, peer review, fraud, plagiarism, responsible collaboration, and conflict of interest. Limited enrollment. (Same course as Chemical Engineering and Materials Science 280 and Chemisitry 280.) (S/U grading only.)—III. (III.)

290. Seminar in Physics (1)
Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in physics. Topics will vary weekly and will cover a broad spectrum of the active fields of physics research at a level accessible to all physics graduate students. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

291. Seminar in Nuclear Physics (1)
Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in nuclear physics. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

292. Seminar in Elementary Particle Physics (1)
Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in elementary particle physics. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

292A. Seminar in Elementary Particle Physics (1)
Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in elementary particle physics. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

292B. High Energy Frontier Initiative And Cosmology Theory Seminar (1)
Seminar—1 hour. Prerequisite: Physics graduate students. May be repeated five times for credit. (S/U grading only.)—I, II, III. (I, II, III.)

293. Seminar in Condensed Matter Physics (1)
Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in condensed matter physics. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

294. Seminar in Cosmology (1)
Seminar—1 hour. Prerequisite: graduate standing in Physics or consent of instructor. Presentation and discussion of topics of current research interest in Cosmology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

295. Introduction to Departmental Research (1)
Seminar—1 hour. Seminar to introduce first- and second-year physics graduate students to the fields of specialty and research of the Physics staff. (S/U grading only.)—II. (II.)

297. Research on the Teaching and Learning of Physics (3)
Seminar—3 hours. Prerequisite: graduate standing in Physics or consent of instructor. Discussion and analysis of recent research in how students construct understanding of physics and other science concepts and the implications of this research for instruction.—III. (III.) Potter

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Courses

371. Teaching in an Active-Engagement Physics Discussion/Lab Setting (1)
Lecture/discussion—1 hour. Prerequisite: course 9D or equivalent; consent of instructor; open to graduate students only. Analysis of recent research on science/physics teaching and learning and its implications for teaching labs, discussions, and discussion/labs with an emphasis on differences between conventional and active-engagement instructional settings. The appropriate role of the instructor in specific instructional settings. May be repeated two times for credit. I, II, III. (I, II, III.)

390. Methods of Teaching Physics (1)
Lecture/discussion—1 hour. Prerequisite: graduate standing in Physics; consent of instructor. Practical experience in methods and problems related to teaching physics laboratories at the university level, including discussion of teaching techniques, analysis of quizzes and laboratory reports and related topics. Required of all Physics Teaching Assistants. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Physiology

See Anatomy, Physiology and Cell Biology (APC), on page 522; Human Physiology (HPH), on page 395; Molecular, Cellular, and Integrative Physiology (A Graduate Group), on page 420; and Neurobiology, Physiology, and Behavior, on page 431.

Plant Biology

See Agricultural Management and Rangeland Resources, on page 141; Crop Science and Management, on page 208; Environmental Horticulture, on page 286; Plant Biology, on page 456; Plant Biology (A Graduate Group), on page 458; and Vegetable Crops, on page 516.

Plant Biology

(College of Biological Sciences)

William J. Lucas, Ph.D., Chairperson of the Department

Anne B. Britt, Ph.D., Vice Chairperson of the Department of Plant Biology

Graduate Program. See Plant Biology (A Graduate Group), on page 458.

Department Office. 1002 Life Sciences
(530) 752-0617; *http://www-plb.ucdavis.edu*

Advising is in College of Biological Sciences, Dean's Office in 202 Life Sciences.

Committee in Charge of the Major

Judy Jernstedt, Ph.D. *(Plant Sciences)*
John Labavitch, Ph.D. *(Plant Sciences)*
Terence Murphy, Ph.D. *(Plant Biology)*

Faculty

Faculty includes members of the Departments of Plant Biology, Molecular and Cellular Biology, and Evolution and Ecology in the College of Biological Sciences and the Department of Plant Sciences in the College of Agricultural and Environmental Sciences.

Primary Department Members

Siobhan Brady, Assistant Professor
Anne Britt, Ph.D., Professor
Simon Chan, Ph.D., Assistant Professor
Luca Comai, Ph.D., Professor
Katayoon Dehesh, Ph.D., Professor
S. P. Dinesh-Kumar, Professor
John J. Harada, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Stacey Harmer, Ph.D., Associate Professor
Bo Liu, Ph.D., Professor
William J. Lucas, Ph.D., Professor
Julin Maloof, Ph.D., Associate Professor
Terence M. Murphy, Ph.D., Professor
Sharman O'Neill, Ph.D., Professor
Neelima Sinha, Ph.D., Professor
Venkatesan Sundaresan, Ph.D., Professor
Steven M. Theg, Ph.D., Professor
Larry N. Vanderhoef, Ph.D., Professor

Secondary Department Members

Judy Callis, Ph.D., Professor
Academic Senate Distinguished Teaching Award
James A. Doyle, Ph.D., Professor *(Geology)*
Marilynn E. Etzler, Ph.D., Professor
Charles S. Gasser, Ph.D., Professor
Marcel Rejmanek, Ph.D., Professor
Raymond L. Rodriguez, Ph.D., Professor
Maureen L. Stanton, Ph.D., Professor
Donald R. Strong, Ph.D., Professor

Emeriti Faculty

redrick T. Addicott, Ph.D., Professor Emeritus
Floyd M. Ashton, Ph.D., Professor Emeritus
David E. Bayer, Ph.D., Professor Emeritus
Bruce A. Bonner, Ph.D., Professor Emeritus
Deborah Canington, Ph.D., Lecturer
Academic Federation Excellence in Teaching Award
Paul A. Castelfranco, Ph.D., Professor Emeritus
Deborah P. Delmer, Ph.D., Professor Emerita
Emanuel Epstein, Ph.D., Professor Emeritus
Richard H. Falk, Ph.D., Professor Emeritus
Hendrick J. Ketellapper, Ph.D., Professor Emeritus
Donald W. Kyhos, Ph.D., Professor Emeritus
Norma J. Lang, Ph.D., Professor Emerita
Thomas L. Rost, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Alan J. Stemler, Ph.D., Professor Emeritus
Robert M. Thornton, Ph.D., Senior Lecturer Emeritus
Academic Senate Distinguished Teaching Award
John M. Tucker, Ph.D., Professor Emeritus
Kenneth Wells, Ph.D., Professor Emeritus

Affiliated Faculty

John L. Bowman, Ph.D., Professor
Tom Goliber, Ph.D., Academic Coordinator
Andrew Groover, Ph.D., Adjunct Assistant Professor

The Major Program

As organisms that sequester carbon and convert solar energy to usable forms, plants are the primary source of food on the planet as well as important buffers against climate change. The Plant Biology major focuses on fundamental aspects of how plants function as organisms and interact with their environment. A wide variety of scientific disciplines are integrated within the Plant Biology major, including physiology, cell and molecular biology, development, genetics and genomics.

The Program. The plant biology major consists of Biosciences core covering the general principles of biology plus four plant-specific classes dealing with advanced aspects of plant biology including physiology, development, and anatomy. Two required electives allow student to tailor their degrees to suit their interests. Independent research in a laboratory setting is a requirement, and majors in Plant Biology are guaranteed this opportunity. Because of the value of plants as a model system for research in molecular genetics, cell biology, and biochemistry, Plant Biology makes an excellent minor or second major for student in these fields.

Career Alternatives. A degree in Plant Biology serves as an excellent launching point for a wide range of career options, including domestic and international opportunities in business, research and teaching in both governmental and private sectors. The program is excellent preparation for students wishing to enter graduate or other professional schools, including medicine, law (particularly environmental or patent law) or journalism. Plant biologist can work in the laboratory, in the field, in the forest, in botanical gardens or nurseries, in agricultural companies, or in biotechnology, pharmaceutical, energy or chemical industries, or in the area of environmental protection.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**34**
Biological Sciences 2A-2B-2C	14
Chemistry 2A-2B, 8A-8B	16
Statistics 13 or 100 or 102 (or Plant Sciences 120)	4
Depth Subject Matter	**41-42**
Biological Sciences 101	4
Plant Biology 102 or 108	5
Evolution and Ecology 140 or Plant Biology 116	4-5
Plant Biology 105, 111, 112, 117	15
Additional upper division units in Plant Biology or related natural science courses	13
Total Units for the Major	**75-76**

Recommended

Chemistry 2C; Evolution and Ecology 100; Plant Biology 118, and Plant Biology 148.

For students with interests in specialized areas of plant biology (e.g. agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed upon prior consultation with a Plant Biology major adviser.

B.S. Major Requirements:

	UNITS
Preparatory Subject Matter	**55-65**
Biological Sciences 2A-2B-2C	14
Chemistry 2A-2B-2C	15
Chemistry 8A-8B or 118A-118B-118C	6-12
Mathematics* 17A-17B-17C or 21A-21B (21C recommended)	8-12
Physics 7A-7B-7C	12

*Mathematics 16A-16B-16C accepted to fulfill this requirement only for transfer students admitted prior to fall 2013.

Recommended

Biological Sciences 20Q

Depth Subject Matter 43-46

Biological Sciences 101, 105 (or102 + 103), 104 or equivalent..... 10-13
Statistics 100 or 102..... 4
Plant Biology 105, 111, 112 11
Research internship: Plant Biology 92, 99, 189, 192, 199 or equivalent 3
Restricted electives..... 15
Upper division courses in plant biology or other fields relevant to the student's interest chosen from the lists below. The student's academic advisor may approve additional courses as "restricted electives" at their discretion.

Total Units for the Major 98-111

Course Lists

Ecology

Environmental Science and Policy 121, 123, 124, 150C, 151, 151L, 155, 155L; Evolution and Ecology 101, 131, 138; Hydrologic Science 124; Plant Biology 117, 119; Plant Pathology 150; Plant Sciences 112, 130, 131, 134, 135, 142, 144.

Evolution and Diversity

Evolution and Ecology 100, 102, 108, 140, 149; Plant Biology 102, 108, 116, 118, 143, 148.

Plant Genetics

Evolution and Ecology 100, 102; Molecular and Cellular Biology 161, 164; Plant Biology 113; Plant Pathology 123; Plant Sciences 152.

Plant Physiology, Development, and Molecular Biology

Biotechnology 160, 161A, 161B; Molecular and Cellular Biology 126; Plant Biology 113, 126; Plant Pathology 123, 130; Plant Sciences 153, 157, 158.

Master Adviser. Bo Liu, Plant Biology Department office in 2165 Life Sciences

Minor Program Requirements:

UNITS

Minor Requirements 18

Upper division units, including at least one course from each of the following four groups 18
(a) Anatomy and Morphology: Evolution and Ecology 140; Plant Biology 105, 116, 118
(b) Physiology and Development: Plant Biology 111, 112, 123; Plant Pathology 130
(c) Evolution and Ecology: Evolution and Ecology 100; Plant Biology 102, 108, 117, 143
(d) Biochemistry and Molecular Genetics: Biotechnology 160; Plant Biology 113, 126; Plant Sciences 152, 154, 171, 172

Minor Adviser. Same as for major above.

Honors and Honors Programs. Students on the honors list may elect to include a maximum of 5 units of 194H in their major programs. Refer to the Academic Information chapter and the appropriate College section for Dean's Honors List information.

Graduate Study. Consult the Plant Biology Graduate Group listing.

Courses in Plant Biology (PLB)

Lower Division Courses

90X. Plant Science Seminar (1-4)

Prerequisite: consent of instructor. Examination of a special topic in a small group setting. Not open for credit to students who have completed course Plant Sciences 90X. (Former course Plant Sciences 90X.)

92. Internship (1-12)

Internship—3-36 hours. Prerequisite: consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology faculty. (P/NP grading only.)

98. Directed Group Study (1-5)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

For questions about courses numbered 102 through 126, see the Plant Biology Department office in 1002 Life Sciences. For questions concerning courses numbered 1, 12, 140 through 188 and 196, see the Plant Science Advising Center in 1220 Plant and Environmental Sciences.

102. California Floristics (5)

Lecture—3 hours; laboratory—8 hours. Prerequisite: Plant Sciences 2, Biological Sciences 1C, 2C, or equivalent course in Plant Sciences. Survey of the flora of California, emphasizing recognition of important vascular plant families and genera and use of taxonomic keys for species identification. Current understanding of relationships among families. Principles of plant taxonomy and phylogenetic systematics. One Saturday field trip. (Same course as Plant Sciences 102.)—III. (III.) Potter

105. Developmental Plant Anatomy (5)

Lecture—3 hours; laboratory—6 hours. Prerequisite: introductory plant biology (for example, Biological Sciences 1C). Survey of vascular plant structure and development. Current ideas and experimental evidence for developmental concepts.—I. (I.) O'Neill

108. Systematics and Evolution of Angiosperms (5)

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C. Diversity and classification of angiosperms (flowering plants) on a world scale, and current understanding of the origin of angiosperms and evolutionary relationships and trends within them based on morphological and molecular evidence. (Same course as Evolution and Ecology 108.) GE credit: SciEng.—III. (III.) Doyle

111. Plant Physiology (3)

Lecture—3 hours. Prerequisite: Biological Sciences 1C, or 2A, 2B, and 2C; Chemistry 8B and Physics 7C (either may be taken concurrently); Plant Biology 105 recommended. The plant cell as a functional unit. The processes of absorption, movement, and utilization of water and minerals. Water loss, translocation, photosynthesis, respiration.—I. (I.) Dehesh, Lucas

111D. Problems in Plant Physiology (1)

Discussion—1 hour. Prerequisite: course 111 concurrently. Discussion of problems and applications relating to principles presented in course 111. Students will be assigned problems each week showing novel applications of principles described in course 111 and will prepare answers to be delivered orally during the class period. (P/NP grading only.)—I. (I.) Lucas, Dehesh

112. Plant Growth and Development (3)

Lecture—3 hours. Prerequisite: Biological Sciences 1C, or 2A, 2B and 2C; Chemistry 8B. Introduction to the mechanisms and control systems that govern plant growth and development and the responses of plants to the environment. Strong emphasis on vegetative development of flowering plants. GE credit: SciEng.—II. (II.) Harada, Sundaresan

112D. Problems in Plant Growth and Development (1)

Discussion—1 hour. Prerequisite: course 112 concurrently. Discussion of problems and applications relating to principles presented in course 112. Students will be assigned problems each week showing novel applications of the principles described in course 112 and will prepare answers to be delivered orally during class period. (P/NP grading only.)—II. (II.) Harada, Sundaresan

113. Molecular and Cellular Biology of Plants (3)

Lecture—3 hours. Prerequisite: Biological Sciences 1A and 1C, or 2A, 2B, 2C; 101; Biological Sciences 102 or 105 recommended. Molecular and cellular aspects of the growth and development of plants and their response to biological and environmental stresses. Primary focus on processes unique to plants. Experimental approaches will be emphasized.—III. (III.) Harada

113D. Problems in Molecular and Cellular Biology of Plants (1)

Discussion—1 hour. Prerequisite: course 113 concurrently. Discussion of topics and applications related to principles presented in course 113. Assigned topics each week show novel applications of the principles described in course 113; discussion of topics during class period. (P/NP grading only.)—III. (III.) Harada

116. Plant Morphology and Evolution (5)

Lecture—3 hours; laboratory—6 hours. Prerequisite: introductory plant biology (e.g., Biological Sciences 1C, or 2A, 2B, and 2C); plant anatomy recommended (e.g., Plant Biology 105). Introduction to the form, development and evolution of vascular plants. Emphasis given to the form and development of reproductive structures in ferns and seed-producing plants as a basis for determining evolutionary relationships. GE credit: SciEng.—II. (II.) Jernstedt

117. Plant Ecology (4)

Lecture—3 hours; fieldwork—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; Plant Biology 111 recommended. The study of the interactions between plants, plant populations or vegetation types and their physical and biological environment. Special emphasis on California. Four full-day field trips and brief write-up of class project required. (Same course as Evolution and Ecology 117.)—I. (I.)

118. Introductory Phycology and Bryology (5)

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A and 1C, or 2A, 2B, and 2C. Comparative morphology, physiology, development and reproduction of cyanobacteria, the major algal groups, and the bryophytes. Focus is on structure-function and evolutionary relationships. Ecological factors and commercial uses are considered. Laboratories include study of living organisms and identification exercises.—II. (II.) Canington

119. Population Biology of Weeds (3)

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C; introductory statistics recommended. Origin and evolution of weeds, reproduction and dispersal, seed ecology, modeling of population dynamics, interactions of weeds and crops, biological control. Laboratories emphasize design of competition experiments and identification of weedy species. (Same course as Evolution and Ecology 119.) Not open for credit to students who have completed Plant Biology 121.—III. (III.) Rejmanek

123. Plant-Virus-Vector Interaction (3)

Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1C, 101; course 105, Plant Pathology 120, and Entomology 100 recommended. Analysis of the interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern experimental approaches to the interdiction of viral movement. Offered alternate years. (Same course as Entomology 123/Plant Pathology 123.)—(I.) Lucas, Gilbertson, Ullman

126. Plant Biochemistry (3)

Lecture—3 hours. Prerequisite: Biological Sciences 103 or 105. The biochemistry of important plant processes and metabolic pathways. Discussion of methods used to understand plant processes, including use of transgenic plants. (Same course as Molecular and Cellular Biology 126.)—II. (II.) Callis, Tian

140. Culinary and Medicinal Herbs (3)
Lecture/discussion—3 hours. Prerequisite: Biological Sciences 1C. Growth, identification, cultivation, and use of common culinary and medicinal herbs; herbal plant families; effects of climate and soils on herbs; herbal medicine; ecology and geography of herbs; herb garden design; secondary chemistry of active compounds. (Same course as Environmental and Resource Sciences 140.)—III. (III.)

143. Evolution of Crop Plants (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Sciences 2 or Biological Sciences 1C or 2C. Origins of crops and agriculture, including main methodological approaches, centers of crop biodiversity, dispersal of crops, genetic and physiological differences between crops and their wild progenitors, agriculture practiced by other organisms, and role and ownership of crop biodiversity. GE credit: Div, SciEng, Wrt.—III. (III.) Gepts

147. Survey of Plant Communities of California (4)
Lecture/discussion—2 hours; fieldwork—3 hours; extensive writing. Prerequisite: Biological Sciences 1A or 1B or 1C or Molecular and Cellular Biology 10 recommended. Consent of instructor required quarter prior to course. Upper division standing required if enrollment must be limited. Selected plant communities analyzed for their structure and the relationship of their component species to the environment. Four weekend field trips required. GE credit: SciEng, Wrt.—III. (III.) Young

148. Introductory Mycology (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Systematics, ecology, evolution, and morphology of fungi. Importance of fungi to humans. (Same course as Plant Pathology 148.)—I. MacDonald, Rizzo

189. Experiments in Plant Biology: Design and Execution (3)
Laboratory/discussion—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or 2A, 2B, 2C, or the equivalent courses in Plant Sciences, and consent of the instructor. Provides an opportunity for undergraduate students to formulate experimental approaches to current questions in plant biology and to carry out their proposed experiments. May be repeated for credit for a total of 12 units. (P/NP grading only.)—I, II, III. (I, II, III.)

190C. Research Conference in Plant Biology (1)
Discussion—1 hour. Prerequisite: upper division standing in Plant Biology or related discipline; consent of instructor. Introduction to research methods in plant biology. Design of field or laboratory research projects, survey of appropriate literature, and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Plant Biology Department faculty. May be repeated for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

194H. Special Study for Honors Students (1-5)
Prerequisite: open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. (P/NP grading only.)

197T. Tutoring in Plant Biology (1-5)
Discussion—2-6 hours. Prerequisite: upper division standing and consent of instructor. Assisting the instructor by tutoring students in one of the Department's regular courses. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Plant Biology (A Graduate Group)

Daniel Potter, Ph.D., Chairperson of the Group

Group Office. 233 Life Sciences
(530) 752-7094; Fax (530) 752-8822
http://www-plb.ucdavis.edu/pbgg
http://biosci3.ucdavis.edu/GradGroups/PB/

Faculty

Douglas Adams, Ph.D., Associate Professor *(Viticulture and Enology)*
Diane Beckles, Ph.D., Assistant Professor *(Plant Sciences)*
Alan Bennett, Ph.D., Professor *(Plant Sciences)*
Alison Berry, Ph.D., Professor *(Plant Sciences)*
Arnold Bloom, Ph.D., Professor *(Plant Sciences)*
Arnold Blumwald, Ph.D., Professor *(Plant Sciences)*
Richard Bostock, Ph.D., Professor *(Plant Pathology)*
Kent Bradford, Ph.D., Professor *(Plant Sciences)*
Siobhan Brady, Ph.D., Assistant Professor *(Plant Biology)*
Anne Britt, Ph.D., Professor *(Plant Biology)*
Patrick Brown, Ph.D., Professor *(Plant Sciences)*
Judy Callis, Ph.D., Professor *(Molecular and Cellular Biology) Academic Senate Distinguished Teaching Award*
Simon Chan, Ph.D., Assistant Professor *(Plant Biology)*
Gitta Coaker, Ph.D., Assistant Professor *(Plant Pathology)*
Doug Cook, Ph.D., Professor *(Plant Pathology)*
Luca Comai, Ph.D., Professor *(Plant Biology)*
Abhaya Dandekar, Ph.D., Professor *(Plant Sciences)*
Katayoon Dehesh, Ph.D., Professor *(Plant Biology)*
James Doyle, Ph.D., Professor *(Evolution and Ecology)*
Georgia Drakakaki, Ph.D. Assistant Professor *(Plant Sciences)*
Jorge Dubcovsky, Ph.D., Professor *(Plant Sciences)*
Don Durzan, Ph.D., Professor *(Plant Sciences)*
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Bryce Falk, Ph.D., Professor *(Plant Pathology)*
Albert Fischer, Ph.D., Associate Professor *(Plant Sciences)*
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David Gilchrist, Ph.D., Professor *(Plant Pathology)*
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Judy Jernstedt, Ph.D., Professor *(Plant Sciences)*
Daniel Klienbenstein, Ph.D. Associate Professor *(Plant Sciences)*
John Labavitch, Ph.D., Professor *(Plant Sciences)*
Clark Lagarias, Ph.D., Professor *(Molecular and Cellular Biology)*
J. Heiner Lieth, Ph.D., Professor *(Plant Sciences)*
Bo Liu, Ph.D., Associate Professor *(Plant Biology)*
William Lucas, Ph.D., Professor *(Plant Biology)*
Julin Maloof, Ph.D., Associate Professor *(Plant Biology)*
Mark Matthews, Ph.D., Professor *(Viticulture and Enology)*
Richard Michelmore, Ph.D., Professor *(Plant Sciences)*
Terence Murphy, Ph.D., Professor *(Plant Biology)*
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Sharman O'Neill, Ph.D., Professor *(Plant Biology)*
Kyaw Tha Paw, Ph.D., Professor *(Land, Air and Water Resources)*
Donald Phillips, Ph.D., Professor *(Plant Sciences)*
Vito Polito, Ph.D., Professor *(Plant Sciences)*
Daniel Potter, Ph.D., Professor *(Plant Sciences)*
Carlos Quiros, Ph.D., Professor *(Plant Sciences)*
Michael Reid, Ph.D., Professor *(Plant Sciences)*
Marcel Rejmanek, Ph.D., Professor *(Evolution and Ecology)*
Eliska Rejmankova, Ph.D., Professor *(Environmental Science and Policy)*
Jim Richards, Ph.D., Professor *(Land, Air and Water Resources)*
Raymond Rodriguez, Ph.D., Professor *(Molecular and Cellular Biology)*
Pamela Ronald, Ph.D., Professor *(Plant Pathology)*
Jeffery Ross-Ibarra, Ph.D., Assistant Professor *(Plant Sciences)*
Mikal Saltveit, Ph.D., Professor *(Plant Sciences)*
Ken Shackel, Ph.D., Professor *(Plant Sciences)*
Wendy Silk, Ph.D., Professor *(Land, Air and Water Resources)*
Neelima Sinha, Ph.D., Professor *(Plant Biology)*
Dina St. Clair, Ph.D. Professor *(Plant Sciences)*
Venkatesan Sundaresan, Ph.D., Professor *(Plant Biology)*
Steve Theg, Ph.D., Professor *(Plant Biology)*
Li Tian, Ph.D., Assistant Professor *(Plant Sciences)*
M. Andrew Walker, Ph.D., Professor *(Viticulture and Enology)*
Larry Williams, Ph.D., Professor *(Viticulture and Enology)*
Valerie Williamson, Ph.D., Professor *(Nematology)*
John Yoder, Ph.D., Professor *(Plant Sciences)*

Affiliated Faculty

John Bowman, Ph.D., Professor *(Plant Biology)*
Carlos Crisosto, Ph.D., Associate Specialist *(Plant Sciences)*
Richard Evans, Ph.D., Lecturer *(Plant Sciences)*
Matthew Fidelibus, Ph.D., Assistant Cooperative Extension Viticulture Specialist *(Viticulture & Enology)*
Sham Goyal, Ph.D., Lecturer *(Plant Sciences)*
Andrew Groover, Ph.D., Assistant Adjunt Professor *(Plant Biology)*
Cai-Zhong Jiang, Plant Physiologist *(Crops Path & Genentic Research)*
Kirk Larson, Ph.D., Pomologist & CE Specialist *(Plant Sciences)*
Elizabeth Mitcham, Ph.D., Associate Specialist *(Plant Sciences)*
Ann Powell, Ph.D., Assistant Researcher *(Plant Sciences)*
Alan Rose, Ph.D., Assistant Researcher Biochemist *(Molecular & Cellular Biology)*
Thomas Tai, Ph.D., Associate AES *(Plant Sciences)*
Allen Van Deynze, Ph.D., Specialist Biotechology *(Plant Sciences)*

Graduate Study. The Graduate Group in Plant Biology offers programs of study and research leading to the M.S. and Ph.D. degrees. The program prepares students for careers in teaching and re-search at colleges and universities, government or industrial laboratories. The graduate curriculum involves both a broad overview of the discipline and in-depth study and research in one of four areas of specialization: cell and developmental biology; systematics and evolutionary biology; environmental and integrative biology; and molecular biology, biochemistry and genomics. These areas of specialization permit individual study and research into diverse aspects of plant biology, including anatomy, biochemistry, cell biology, cytology, developmental biology, ecology, genetics, molecular biology, morphology, paleo-botany, physiology, population biology, systematics, and weed science.

Preparation. For both the M.S. and Ph.D. programs, a level of scholastic development equivalent to a Bachelor's degree in biological sciences from a recognized college or university is required. Courses in the following areas are considered to be prerequi-

site to the advanced degrees in Plant Biology: inorganic chemistry, organic chemistry, introductory physics, genetics, structural botany, biochemistry, introductory plant physiology, introductory plant physiology laboratory, calculus, introductory statistics, plant ecology/systematics/evolution, genetics, and plant cell/molecular biology. Limited deficiencies can be made up after admission. The graduate adviser, the major professor, and the student will design a program of advanced courses to meet individual academic needs within one of the specializations.

Graduate Adviser. Contact the Group office.

Courses in Plant Biology (PBI)

Graduate Courses

200A. PBGG Core Course Series-Fall quarter (5)
Lecture—3 hours; discussion—2 hours. Prerequisite: graduate standing; a broad background of undergraduate-level coursework in Plant Biology is recommended. The first of three PBGG graduate core courses. Coverage includes (1) plant genes, (2) biotechnology, (3) genomes and gene flow, (4) principles of plant systematics, and (5) the evolution of flowering plants.—I. (I.) Potter

200B. PBGG Core Course Series—Winter quarter (5)
Lecture—3 hours; discussion—2 hours. Prerequisite: course 200A. The second of three PBGG graduate core courses. Coverage includes (1) embryo development, (2) cytoskeleton and vesicle trafficking, (3) cell walls, (4) cell growth, (5) secondary metabolism, (6) plastids and (7) senescence.—II. (II.) Labavitch

200C. PBGG Core Course Series—Spring quarter (5)
Lecture—3 hours; discussion—2 hours. Prerequisite: course 200A and 200B. The third of three PBGG graduate core courses. Coverage includes (1) plant water relations, (2) cellular & long distance transport processes, (3) mineral nutrition, (4) environmental impacts on growth & development, (5) stress perception & responses, (6) canopy processes, and (7) plant interactions with other organisms.—III. (III.) Blumwald, Silk

201. Plant Senescence: Cellular and Molecular Aspects (4)
Lecture—4 hours. Prerequisite: Plant Biology 111, 112; Biological Sciences 102 and 103. Cellular and molecular phenomena associated with the senescence of plants and plant parts. Emphasis on principles and mechanisms. Offered in alternate years.—I. Reid

202. Advanced Physiology of Cultivated Plants (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing, Plant Biology 111 or the equivalent. Physiological processes as they pertain to growth and partitioning in higher plants. Background lectures on source-sink concepts and current areas of investigation followed by weekly roundtable discussion led by students on focused sub-topics in the source-sink area. Offered in alternate years. (S/U grading only.)—I. DeJong

203N. Biology of the Plant Cell (4)
Lecture—3 hours; discussion/laboratory—2 hours. Prerequisite: Plant Biology 111 or Biological Sciences 104, or the equivalent. Recent progresses in plant cell biology. Intracellular motility in plant cells. Common techniques associated with the progress of plant cell biology. Open to senior undergraduate students in Plant Biology major. Offered in alternate years. (S/U grading only.)—I. Liu

205B. Advanced Plant Physiology (3)
Lecture/discussion—3 hours. Prerequisite: Plant Biology 111, 112, and Biological Sciences 103. Photosynthesis, photophosphorylation, chloroplast metabolism and biology. Offered in alternate years.—II. Theg

205C. Advanced Plant Physiology/ Biochemistry (3)
Lecture—3 hours. Prerequisite: Plant Biology 111, 112, Biological Sciences 103. Integrative studies that combine physiological, biochemical and molecular approaches to study of plant metabolism. Fundamentals of basic metabolic pathways extending to use of mutants and genetic engineering to dissect such pathways; how pathways are integrated and respond to signals. Offered in alternate years.—III.

208. Plant Hormones and Regulators (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Biology 112. Chemistry, biochemistry and physiological activity of major classes of natural plant growth regulators. Primary consideration given to concepts that are of current research interest. Growth regulators in agriculture. Offered in alternate years.—II.

210. Plant Ecophysiology (3)
Lecture—3 hours. Prerequisite: Plant Biology 111, 112, 117. Study of the mechanisms of physiological adaptation of plants to their environment. Offered in alternate years.—(II.)

211. Ecophysiological Methods (3)
Lecture—1 hour; laboratory—4 hours; individual project; one Saturday field trip to be arranged. Prerequisite: Plant Biology 111, 117, and consent of instructor. A laboratory and lecture course covering basic concepts underlying the research methods and instrumentation useful in plant ecophysiology. Offered in alternate years.—III.

212. Physiology of Herbicidal Action (3)
Lecture—3 hours. Prerequisite: Plant Biology 112, 122. Study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants. Offered in alternate years.—III.

214. Higher Plant Cell Walls (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 112, and a course in biochemistry. Lectures focus on the structure, analysis, synthesis, and development-related metabolism of cell walls. Discussions center on analysis of scientific papers related to lecture topics. Offered in alternate years.—I. Labavitch, Nevins

217. Membrane Biology of Plants (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 112 and Biological Sciences 103, or consent of instructor. Structure, biogenesis, and function of plant cell membranes. Emphasis will be placed on the molecular basis of plant membrane functions and on the role of membranes in selected physiological processes. Offered in alternate years.—(III.) Lucas

218A. Advanced Concepts in Plant Cell Biology: Cell Biogenesis (3)
Lecture/discussion—3 hours. Prerequisite: Biological Sciences 102, 103. Survey of molecular mechanisms underlying structural and functional differentiation of plant cell subcellular compartments. Topics include membrane and protein biosynthesis, protein targeting and turnover, and regulation of nuclear and organellar gene expression as related to the biogenesis of plant cell organelles. Offered in alternate years.—(II.) Bennet, Theg

218B. Advanced Concepts in Plant Cell Biology: Signal Transduction and Intercellular Communication (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102, 103 or consent of instructor. Intracellular signal transduction pathways in the plant cells as well as longer term, adaptive responses which involve signals transmitted between plant cells. Weekly lectures and student-led discussions on current literature. Offered in alternate years.—III. Lucas, Dehesh

219. Reproductive Biology of Flowering Plants (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Plant Biology 111 and Biological Sciences 101. Fundamental mechanisms of reproductive biology of flowering plants and their influence on genetic variation, evolution, and cultural practices. Offered in alternate years. (Former course Plant Sciences 270.)—(I.)

220. Plant Developmental Biology (4)
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: plant anatomy, physiology, and biochemistry. A survey of the concepts of plant development and organization. Examines plant cells, tissues, and organs with special emphasis on experimental evidence for mechanisms regulating developmental processes. Offered in alternate years.—Sinha

223. Special Topics in Scientific Method (2)
Discussion—2 hours. Examine the historical and philosophical background of the scientific method. Analyze the rational, perceptual, causal, creative and social aspects of scientific knowledge. Clarify the roles of reason, experimentation and creativity in scientific research. (S/U grading only.)—I. (I.) Bradford

225. Methods and Instrumentation for Crop and Soil Science (3)
Lecture—1 hour; laboratory—3 hours; discussion—1 hour. Prerequisite: basic knowledge of plant physiology, soil science, chemistry and physics. Theory and practice of in situ sampling and instrumentation methods for crop science (broadly defined to include tree crops) and related aspects of soil science (e.g., moisture and fertility) and laboratory analysis. Offered in alternate years.—III.

227. Plant Molecular Biology (4)
Lecture/discussion—4 hours. Prerequisite: Molecular and Cellular Biology 121 or 161. Molecular aspects of higher plant biology with emphasis on gene expression. Plant nuclear and organelle genome organization, gene structure, mechanisms of gene regulation, gene transfer, and special topics related to development and response to biological and environmental stimuli.—(II.) Britt, Sinha

229. Molecular Biology of Plant Reproduction (3)
Lecture—3 hours. Molecular genetic basis of plant reproduction. Emphasis on understanding developmentally regulated gene expression as it relates to the major changes that occur during plant reproduction and on the genetic control of flowering. Offered in alternate years.—O'Neill

290A. Faculty Seminar (1)
Discussion—1 hour. Discussion of research area of seminar speakers in Plant Biology Graduate Group Seminar Series. Restricted to Plant Biology graduate students (PBGG). May be repeated six times for credit. (S/U grading only.)—I, II, III. (I, II, III.)

290B. Seminar (1)
Seminar—1 hour. Seminars presented by visiting scientists on research topics of current interest. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Research Conference in Botany (1)
Discussion—1 hour. Prerequisite: graduate standing and/or consent of instructor. Presentation and discussion by faculty and graduate students of research projects in botany. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

291. Graduate Student Seminar in Plant Biology (1)
Seminar—1 hour. Prerequisite: graduate student standing. Student-given seminars on topics in plant biology, with critiques by instructor and peers. How to give a seminar, including preparation of visual and other teaching aids. Topic determined by instructor in charge. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

292. Seminars in Plant Biology (1)
Seminar—1 hour. Prerequisite: consent of instructor. Review of current literature in botanical disciplines. Disciplines and special subjects to be announced quarterly. Students present and analyze assigned topics. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

293. Seminar in Postharvest Biology (1)
Discussion—1 hour. Prerequisite: consent of instructor; open to advanced undergraduates. Intensive study of selected topics in the postharvest biology of

fruits, vegetables, and ornamentals. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

297T. Tutoring in Plant Biology (1–5)
Tutorial—3–15 hours. Offers graduate students, particularly those not serving as teaching assistants, the opportunity to gain teaching experience. (S/U grading only.)

298. Group Study (1-5)
May be repeated up to four times for credit. (S/U grading only.)

299. Research (1-12)
Prerequisite: graduate standing. (S/U grading only.)

Professional Course

390. The Teaching of Plant Biology (2)
Discussion—2 hours. Prerequisite: graduate standing; concurrent appointment as a teaching assistant in Plant Biology. Consideration of the problems of teaching botany, especially of preparing for and conducting discussions, guiding student laboratory work, and the formulation of questions and topics for examinations. (S/U grading only.)—I, II, III. (I, II, III.)

Plant Pathology

(College of Agricultural and Environmental Sciences)

Thomas R. Gordon, Ph.D., Chairperson of the Department

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http://plantpathology.ucdavis.edu/course/index.htm

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R. Michael Davis, Ph.D., Professor
Lynn Epstein, Ph.D., Professor
Bryce W. Falk, Ph.D., Professor
Robert L. Gilbertson, Ph.D., Professor
David G. Gilchrist, Ph.D., Professor
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W. Douglas Gubler, Ph.D., Lecturer
Themis Michailides, Ph.D., Lecturer
Adib Rowhani, Ph.D., Lecturer
Krishna Subbarao, Ph.D., Lecturer
Mysore Sudarshana, Ph.D., Lecturer *(USDA)*
Takao Kasuga, Ph.D., Lecturer *(USDA)*

Related Major Program. See the major in Plant Biology, on page 456.

Graduate Study. The Department of Plant Pathology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information can be obtained from the graduate adviser. See also the Graduate Studies, on page 108.

Graduate Advisers. R. M. Davis, G. L. Coaker, R, M. Bostock

Courses in Plant Pathology (PLP)

Lower Division Course

40. Edible Mushroom Cultivation (2)
Lecture—1 hour; laboratory/discussion—3 hours. Prerequisite: Biological Sciences 10 or Microbiology 20 recommended. Principles and practices of growing edible mushrooms, including culture maintenance, basic mushroom substrate preparation, composting, spawn generation techniques, inoculation methods, harvesting, and pests and pest management.—II. (II.) Davis

Upper Division Courses

120. Introduction to Plant Pathology (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C; Microbiology 102 recommended. The nature, cause, and control of plant diseases.—I, III. (I, III.) Bostock, Falk, Gilbertson

123. Plant-Virus-Vector Interaction (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1C, 101; Plant Biology 105, course 120, and Entomology 100 recommended. Analysis of the interactions necessary for viruses to infect plants. Interactions among insect vectors and host plants involved in the plant-virus life cycle. Evolutionary aspects of the molecular components in viral infection and modern experimental approaches to the interdiction of viral movement. Offered alternate years. (Same course as Entomology 123/Plant Biology 123.)—I. Gilbertson, Lucas, Ullman

130. Fungal Biotechnology and Biochemistry (3)
Lecture—3 hours. Prerequisite: Plant Biology 119, Biological Sciences 103. How fundamental physiological and biochemical activities of fungi impact the destructive and beneficial roles of these organisms in nature. Utilization and manipulation of fungi for biotechnological and industrial applications.—II. (II.) Gilchrist

135. Field Identification of Mushrooms (1)
Field work; three-day mandatory field trip. Prerequisite: introductory course in biological sciences; course in mycology recommended. Collection and identification of mushrooms and other fleshy fungi based on macro and microscopic features. (P/NP grading only.)—II. (II.) Davis

140. Agricultural Biotechnology and Public Policy (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: high school level biology, including genetics; Biological Sciences 10 recommended. Examination of the development and deployment of agricultural biotechnologies, particularly transgenic crop plants, microorganisms and animals, with consideration of conventional agriculture, public perceptions of technologies, food safety, environmental impact, public policies and regulations. GE credit: SciEng, Wrt.—III. (III.) Bruening, Newell-McGloughin, Williamson

148. Introductory Mycology (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Systematics, ecology, evolution, and morphology of fungi. Importance of fungi to humans. (Same course as Plant Biology 148.)—I. MacDonald, Rizzo

150. Fungal Ecology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1C or equivalent. The ecological roles of fungi as saprobes, mutualists and parasites in native and managed ecosystems. Physiological and reproductive strategies associated with adaptations to diverse habitats.—II. (II.) Gordon

151A-151B. Fungal Biodiversity in Natural Environments (4-4)
Lecture—1 hour; laboratory—6 hours; field work—three or four one-day-long weekend field trips. Prerequisite: introductory course in mycology (e.g., Plant Biology 148/course 148); Plant Pathology 150 (may be taken concurrently). Fungal biodiversity within a natural habitat. Fungi collected on field trips will be identified during laboratory periods. The ecological roles of the various fungal taxa are emphasized. Offered in alternate years.—(II-III.) MacDonald

155. Ecology of Forest Diseases (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Tree diseases and their role in temperate and tropical forest ecosystems. Impacts of both native and exotic pathogens. Interactions between forest pathogens and insects. Approaches to management and regulation. One field trip is required. Offered in alternate years.—III. Rizzo

185. Advanced Mushroom Taxonomy (2)
Laboratory/discussion—3 hours; fieldwork—1 hour. Prerequisite: course 135 or 148, and Biological Sciences 101 or the equivalent. Microscopic and molecular methods used in the identification of mushroom species; molecular characterization including PCR-amplification of ribosomal nuclear DNA, digestion of the product with restriction enzymes, and DNA sequencing; a one-day field trip is required. Offered in alternate years.—I. Davis

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: course 120 and consent of instructor. Work experience off and on campus, supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

201A. Impacts, Mechanisms and Control of Plant Disease (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 120, graduate student status in the Plant Pathology Graduate Program, or consent of instructor. A case-studies approach to analysis of plant diseases caused by bacteria, fungi, oomycetes, and viruses, including impacts, etiology, pathogen taxonomy and epidemiology, biochemical and genetic aspects of pathogen-host interactions, virulence and resistance, and approaches to disease control.—II. (II.) Gordon

201B. Impacts, Mechanisms and Control of Plant Disease (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 120, course 201A, and graduate student status in the Plant Pathology Graduate Program, or consent of instructor. A case-studies approach to analysis of plant diseases, including emerging diseases, caused by bacteria, fungi, nematodes, and oomycetes: impacts, etiology, pathogen taxonomy, epidemiology, biochemical and genetic aspects of pathogen-host interactions, virulence, resistance, disease control and statistical analysis.—III. (III.) Bostock

205A. Diseases of Vegetable and Field Crops (3)
Lecture/discussion—3 hours; fieldwork—3 hours. Prerequisite: course 120. Clinical study of diseases of vegetable and field crops with emphasis on etiology, epidemiology, diagnosis, and control. Field trips required. Offered in alternate years.—III. Davis

205B. Diseases of Vegetable and Field Crops—Summer Field Trip (1)
Fieldwork—3 hours. Prerequisite: courses 120 and 205A. Continuation of course 205A—four-day field trip investigating diseases of vegetable and field crops (Deferred grading only, pending completion of sequence. S/U grading only.)—IV. (IV.) Davis

206A-206B. Diseases of Fruit, Nut, and Vine Crops (3-1)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120; Plant Biology 119. Course 205 may be taken concurrently. Clinical study of fruit, nut, and vine crops diseases with emphasis on etiology, epidemiology, diagnosis, and control. Offered in alternate years. (Deferred grading only, pending completion of sequence.)—III-IV. (III-IV.) Kirkpatrick

208. Ecology of Plant Pathogens and Epidemiology of Plant Diseases (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 120 or the equivalent. Interaction between higher plants, plant pathogens, and the environment which is important in the occurrence and severity of plant disease. Emphasis is placed on the population dynamics and ecology of plant pathogens in the aerial and soil environment. Offered in alternate years.—III.

209. Principles of Plant Disease Control (3)
Lecture—3 hours. Prerequisite: course 120 or the equivalent. Discussion of the underlying principles and methods used for the control of plant diseases. Emphasis placed on application of epidemiological principles, biological (including host resistance), and chemical strategies to achieve disease control. Offered in alternate years.—II.

210. Biochemistry and Molecular Biology of Plant–Microbe Interaction (4)
Lecture/discussion—4 hours. Prerequisite: Biological Sciences 101, 102, 103, and 104, or the equivalent. Discussion of plant–microbe interactions, focused on the underlying cellular, biochemical, and molecular events that determine the diseased state. Offered in alternate years.—I. Bostock, Coaker

215X. Genetics and Molecular Biology of Plant Pathogens (4)
Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 120 and Biological Sciences 101. Genetic analysis of pathogenicity, cultivar-specificity, and host-specificity in plant pathogens, particularly fungi; application of molecular biology to the isolation and characterization of the genes involved; and to aspects of pathogen identification; emphasis on research techniques and problem-solving. Offered in alternate years.—(II.)

217. Molecular Genetics of Fungi (3)
Lecture—3 hours. Prerequisite: graduate standing in a biological science, Biological Sciences 101, 103, Molecular and Cellular Biology 161, Plant Biology 119, courses 130, 215X; Microbiology 215 recommended. Advanced treatment of molecular biology and genetics of filamentous fungi and yeasts, including gene structure, organization and regulation; plant pathogenesis; secretion; control of reproduction; molecular evolution; transformation; and gene manipulation. Offered in alternate years. (Same course as Biological Chemistry 217.)—II.

222. Experimental Approaches in Plant Pathology (2)
Lecture—2 hours. Prerequisite: course 120 or the equivalent. Experimental approaches, methods of analysis and techniques used in current research in plant pathology, particularly with fungi. Avoiding common research pitfalls. Offered in alternate years.—II. Epstein

224. Advanced Mycology (4)
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 148 or Plant Biology 148 or consent of instructor. Systematics, evolution, and ecology of the fungi. Topics include modern techniques and theories on classification of fungi, species concepts, sexual compatibility and vegetative compatibility. Laboratories emphasize various approaches to fungal identification. Offered in alternate years.—III. Epstein, Rizzo

228. Plant Bacteriology (5)
Lecture—2 hours; laboratory—9 hours. Prerequisite: course 120; Microbiology 2 or the equivalent; Biological Sciences 102, 103. Study of bacteria which have a saprophytic, symbiotic, or parasitic association with higher and lower plants. Clinical and molecular methods for identification and classification of these bacteria. Offered in alternate years.—(I.) Kirkpatrick, Gilbertson

230. Plant Virology (3)
Lecture—3 hours. Prerequisite: upper division or graduate course in molecular biology or graduate student in plant pathology. Viruses as causal agents of plant disease and as tools for manipulating plants; structures of virus particles; mechanisms of transmission, replication, and spread in the plant; cytology and molecular biology in susceptible and resistant reactions to virus infection; virus disease control. Only 2 units of credit to students who have completed Microbiology 262. Not open for credit to students who have completed course 226. Offered in alternate years.—II. Bruening, Falk

230L. Plant Pathology Laboratory (2)
Laboratory—6 hours. Prerequisite: course 230 (may be taken concurrently). Experimental approaches and methods for plant virus identification; investigation of plant virus infection cycles, disease induction, plant reaction to infection, and the structure of virus particles. Not open for credit to students who have completed course 226.—Bruening, Falk

290. Seminar (1)
Seminar—1 hour. Review and evaluation of current research in plant pathology. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Advanced Research Conference (1)
Seminar—1 hour. Prerequisite: course 120 or consent of instructor. Presentation, evaluation, and critical discussions of research activities in the area of advanced plant pathology; primarily designed for graduate students. (S/U grading only.)—I, II, III. (I, II, III.)

291. Seminar in Molecular Plant Pathology (1)
Seminar—1 hour. Prerequisite: course 120 or consent of instructor. Review and evaluation of current literature and research in biochemistry and molecular biology of plant microbe interactions. May be repeated for credit. (S/U grading only.)—I, II. (I, II.) Bostock, Coaker, Cook, Gilchrist, VanAlfen

293. Seminar on Soil Microbiology and Root Diseases (1)
Seminar—1 hour. Prerequisite: basic knowledge of soil microbiology and plant pathology. Critical reviews of current research papers related to soil microbiology and ecology, soil-borne plant pathogens, and/or biological control. May be repeated for credit. (S/U grading only.)—II. Epstein

295. Seminar in Mycology (1)
Seminar—1 hour. Review and evaluation of current literature and research in mycology. May be repeated for credit. (S/U grading only.)—III. (III.) Rizzo

298. Special Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Plant Physiology

See Plant Biology, on page 456; and Plant Biology (A Graduate Group), on page 458.

Plant Protection and Pest Management

See Integrated Pest Management (A Graduate Group), on page 343.

Plant Sciences

(College of Agricultural and Environmental Sciences)

Chris van Kessel, Ph.D., Chairperson of the Department

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Truman P. Young, Ph.D., Professor
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Milton B. Jones, Ph.D., Lecturer Emeritus
Adel A. Kader, Ph.D., Professor Emeritus
Distinguished Graduate Mentoring Award
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William C. Liebhardt, Ph.D., Lecturer Emeritus
William M. Longhurst, Ph.D., Professor Emeritus
Robert S. Loomis, Ph.D., Professor Emeritus
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Robert B. Hutmacher, Ph.D., Agronomist and Specialist in Cooperative Extension
Scott Johnson, Ph.D., Lecturer and Specialist in Cooperative Extension
Stephen R. Kaffka, Ph.D. Lecturer and Specialist in Cooperative Extension
Gurdev Khush, Ph.D., Adjunct Professor
Bruce Lampinen, Ph.D., Associate Specialist in Cooperative Extension
W. Thomas Lanini, Ph.D., Lecturer and Specialist in Cooperative Extension
Kirk Larson, Ph.D., Pomologist and Specialist in Cooperative Extension
Thomas Ledig, Ph.D., Adjunct Professor
Muhammad Marrush, Ph.D., Continuing Lecturer
Elizabeth J. Mitcham, Ph.D., Lecturer, Pomologist and Specialist in Cooperative Extension
Jeffrey P. Mitchell, Ph.D., Lecturer, Horticulturist and Specialist in Cooperative Extension
Lorence R. Oki, Ph.D., Lecturer and Associate Specialist in Cooperative Extension
Dan E. Parfitt, Ph.D., Lecturer and Pomologist
Daniel H. Putnam, Ph.D., Lecturer, Agronomist and Specialist in Cooperative Extension
Trevor V. Suslow, Ph.D., Lecturer, Postharvest Horticulturist and Specialist in Cooperative Extension
Kenneth W. Tate, Ph.D., Lecturer and Specialist in Cooperative Extension
Steven R. Temple, Ph.D., Lecturer and Specialist in Cooperative Extension

Major Programs. See Biotechnology, on page 181, Ecological Management and Restoration, on page 218, Environmental Horticulture and Urban Forestry, on page 287, and Plant Sciences, on page 461.

Related Courses. See the Biotechnology, Environmental Horticulture, Horticulture and Agronomy, and Plant Biology course listings.

Graduate Study. For related graduate study, see the M.S. degree program in International Agricultural Development, and the M.S. and Ph.D. degree programs in the graduate groups of Horticulture and Agronomy, Plant Biology, Ecology, Genetics, Geography, and Soils and Biogeochemistry. See also Graduate Studies, on page 109.

The Major Program

The Plant Sciences major is designed for students who are interested in a scientific understanding of how plants grow and develop in managed agricultural ecosystems and how plant products are utilized for food, fiber and environmental enhancement. Advances in science and technology have provided new insights and options for using plants to address the issues associated with providing renewable food, fiber and energy resources for a growing global population while minimizing adverse impacts on the natural environment. Graduates in Plant Sciences are able to apply their skills and knowledge to a diverse range of agricultural and environmental goals or pursue advanced degrees in plant sciences.

The Program. The curriculum provides depth in the biological and physical sciences and a sound understanding of how plants obtain and utilize resources from their environment to sustain their growth and development. The influences of genetics, management systems and environmental inputs on crop development and productivity are emphasized along with the postharvest preservation and marketing of plant products. Students will develop an area of specialization with options in Crop Production, Plant Genetics and Breeding, or Postharvest Biology and Technology. An Individual option is also available to match specific subject matter or career goal interests in the plant sciences. All students gain practical experience through a combination of practical laboratory courses and internships. Students may also pursue an Honors thesis in their senior year.

Career Alternatives. Graduates from this program are prepared to pursue a wide range of careers, including various technical and management positions in agricultural and business enterprises, farming, or consulting; public, private, and non-profit agencies; Cooperative Extension; international development; teaching; or agricultural and environmental journalism and communication services. Graduates are qualified to pursue graduate studies in the natural and agricultural sciences, such as plant biology, genetics, breeding, horticulture, agronomy, biotechnology, ecology, environmental studies, pest management, education, or business management.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 57-64
- Biological Sciences 1A, 1B, or 2A, 2B 14-15
- Plant Sciences 2 4
- Chemistry 2A, 2B, 2C 15
- Chemistry 8A, 8B or 118A, 118B, 118C 6-12
- Physics 1A, 1B or 7A, 7B, 7C 6-12
- Mathematics 16A, 16B, or 17A, 17B 6-8
- Plant Sciences 120 4
- Plant Sciences 21 3
- Applied Biological Systems Technology 49 or Plant Sciences 49 (recommended) 2-3

Depth Subject Matter 39-43
- Plant Sciences 100A, 100B, 100C 9
- Plant Sciences 100AL, 100BL, 100CL 6
- Plant Sciences 152 4
- Evolution and Ecology 100 or Plant Biology 102 or 108 or 143 3-5
- Plant Biology 117 or 147 or Plant Sciences 142 or Environmental Horticulture 160 and 160L 4
- Two courses chosen from Plant Pathology 120, Entomology 110, Nematology 100, Plant Sciences 176 7-9
- Plant Sciences 101 3
- Internship; Plant Sciences 192 3

Areas of Specialization (choose one)

Crop Production Option 27-33
- Complete the two courses in pest management not completed for the depth subject matter: Plant Pathology 120, Entomology 110, Nematology 100, Plant Sciences 176 7-9
- Soil Science 100 5
- Plant Sciences 171 4
- Agricultural and Resource Economics 15 or Economics 1A 4
- Select two courses from Plant Sciences 110A, 110B, 110C, 113, 114, 170A, 170B, Environmental Horticulture 125 4-6
- Restricted Electives 3-5
- Select from: Agricultural and Resource Economics 130, 140, Hydrology 110, 124, Soil Sciences 109, Plant Sciences 158, Biotechnology 160

Plant Breeding and Genetics Option..... 27
- Biological Sciences 101 4
- Plant Sciences 154 4
- Biotechnology 160 3
- Biotechnology 161B 6
- Plant Sciences 171 4
- Restricted Electives 6
- Select from: Plant Sciences 110A, 110B, 110C, 112, 113, 114, 141, 151, 158, 170A, 170B, Environmental Horticulture 125, 150, International Agricultural Development 170, Agricultural and Resource Economics 100A, 130, 138, Biotechnology 150, Hydrology 124

Postharvest Biology and Technology Option..... 26
- Plant Sciences 172 4
- Plant Sciences 173 4
- Plant Sciences 174 3
- Plant Sciences 196 3
- Restricted Electives 12
- Select from: Agricultural and Resource Economics 100A, 130, Food Science and Technology 107, 109, 131, Plant Sciences 151, 212

Individual Option 25
- Select a minimum of 25 upper division units, with approval from a faculty advisor, to form a coherent program of study resulting in expertise and competence in a sub-discipline of plant sciences.

Total Units for the Major 118-147

Major Adviser. A.B. Bennett

Advising Center for the major is located in 1220 Plant and Environmental Sciences (530) 752-1715.

Courses in Plant Sciences (PLS)

(Formerly courses in Agricultural Management and Rangeland Resources, Agronomy, Crop Science and Management, Plant Biology, Pomology, Range Science and Vegetable Crops.)

Lower Division Courses

1. Agriculture, Nature and Society (3)
Lecture—2 hours; discussion/laboratory—1 hour. Multiple perspectives and connections between natural sciences, social sciences, and agriculture.

Emphasizes agriculture's central position between nature and society and its key role in our search for a productive, lasting and hospitable environment. Several full-period field trips provide hands-on learning. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 1. (Former Course Agricultural Management and Rangeland Resources 1.)—I. (I.) Gradziel

2. Botany and Physiology of Cultivated Plants (4)

Lecture—3 hours; discussion/laboratory—3 hours. Prerequisite: high school course in biology and chemistry recommended. A holistic introduction to the underlying botanical and physiological principles of cultivated plants and their response to the environment. Includes concepts behind plant selection, cultivation, and utilization. Laboratories include discussion and interactive demonstrations. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 2. (Former course Agricultural Management and Rangeland Resources 2.)—II. (II.) Saltveit, Marrush

5. Plants for Garden, Orchard and Landscape (2)

Lecture—1 hour; laboratory—3 hours. Prerequisite: for non-majors. Hands-on experience with plants cultivated for food, environmental enhancement and personal satisfaction. Topics include establishing a vegetable garden, pruning and propagation activities, growing flowers and ornamental plants, and the role of plants in human health and well-being. Not open for credit to students who have completed Plant Biology 1 or Plant Sciences 2. (Former course Plant Biology 1.)—I, III. (I, III.) Marrush

6. Flower Power—Art and Science of Flowers and Their Uses (2)

Lecture/discussion—2 hours. Prerequisite: high school biology. Introduction to the art and science of using and growing flowers to harness the power that is represented by their aesthetic beauty. Handling, production, arranging, breeding and marketing of flowers. Emphasis on potted plants and cut-flowers. (P/NP grading only.)—III. (III.) Lieth

8. Fruits and Nuts of California and the World (3)

Lecture—3 hours. Field trip seventh week of quarter. Biological and environmental principles of tree-crop agriculture emphasizing California production. Topics include temperate and subtropical species, biotechnology and genetic improvement, environmental physiology, plant and crop growth, pest and disease control, consumer issues. Not open for credit to students who have completed Plant Sciences 10. (Former course Plant Sciences 10.) GE Credit: SciEng.—II. (II.)

12. Plants and Society (4)

Lecture—3 hours; extensive writing—3 hours. Prerequisite: high school biology. Dependence of human societies on plant and plant products. Plants as resources for food, fiber, health, enjoyment and environmental services. Sustainable uses of plants for food production, raw materials, bioenergy, and environmental conservation. Global population growth and future food supplies. Not open for credit to students who have complete Plant Biology 12. (Former course Plant Biology 12.) (Same course as Science and Society 12.) GE Credit: Div, SciEng or SocSci, Wrt.—I, II, III. (I, II, III.) Fischer, Jasieniuk, Nevins, Tian

14. Introduction to Current Topics in Plant Biology (4)

Discussion—3 hours; term paper. Introduction to scientific methods and current understanding of genetics, metabolism, and cellular structure in plants, with special emphasis on topics related to societal issues, such as herbal medicines and genetically modified organisms. Designed for students not specializing in biology. Not open for credit to students who have completed Plant Biology 11. GE Credit: SciEng, Wrt.—I. (I.) Inoue

15. Introduction to Sustainable Agriculture (4)

Lecture—3 hours; laboratory—3 hours. Multidisciplinary introduction to agricultural sustainability with a natural sciences emphasis. Sustainability concepts and perspectives. Agricultural evolution, history, resources and functions. Diverse agricultural systems and practices and their relative sustainability. Laboratories provide direct experience with selected agricultural practices and systems—III. (III.) Van Horn

21. Application of Computers in Technology (3)

Lecture—2 hours; laboratory/discussion—2 hours. Prerequisite: high school algebra. Concepts of computing and applications using personal computers, spreadsheets, database management, word processing and communications. Not open for students who have completed Agricultural Management and Rangeland Resources 21. (Former course Agricultural Management and Rangeland Resources 21.)—I, II, III. (I, II, III.) Laca, Lieth, Saltveit

49. Organic Crop Production Practices (3)

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Principles and practices of organic production of annual crops. Including organic crops, soil, and pest management, cover cropping, composting, seeding, transplanting, irrigation, harvesting and marketing. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 49. (Former course Agricultural Management and Rangeland Resources 49.) (P/NP grading only.)—I, III. (I, III.) Van Horn

92. Internship (1-12)

Internship—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in subject areas pertaining to plant and environmental sciences. Internship supervised by faculty member. May be repeated for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

98. Directed Group Study (1-5)

Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

Upper Division Courses

100A. Metabolic Processes of Cultivated Plants (3)

Lecture—3 hours. Prerequisite: course 2 or Biological Sciences 1C or consent of instructor. Principles of energy capture and photosynthesis, water use, and nutrient cycling. Conversion of these resources into products (carbohydrates, proteins, lipids, and other chemicals) by plants. Emphasis on the relationships between environmental resources, plant metabolism and plant growth.—I. (I.) Fischer, Zakharov

100AL. Metabolic Processes of Cultivated Plants Laboratory (2)

Lecture/discussion—3 hours. Prerequisite: course 100A or the equivalent (may be taken concurrently). Techniques and instruments used to study plant metabolic processes, including water relations, respiration, photosynthesis, enzyme kinetics, microscopy, immunochemistry, and nitrogen fixation. Quantitative methods, problem solving, and practical applications are emphasized.—(I.) Blumwald

100B. Growth and Yield of Cultivated Plants (3)

Lecture—3 hours. Prerequisite: course 100A or consent of instructor. Principles of the cellular mechanisms and hormonal regulation underlying plant growth, development, and reproduction. Emphasis on how these processes contribute to the harvestable yield of cultivated plants and can be managed to increase crop productivity and quality.—II. (II.) Labavitch, Saltveit

100BL. Growth and Yield of Cultivated Plants Laboratory (2)

Lecture/discussion—3 hours. Prerequisite: course 100B or equivalent (may be taken concurrently). Laboratory exercises in plant growth and development and their regulation, including photomorphogenesis, plant growth regulators, plant anatomy, seed germination, fruit ripening and senescence. Includes field trips to illustrate relationships to cropping and marketing systems.—(II.) Blumwald

100C. Environmental Interactions of Cultivated Plants (3)

Lecture—3 hours. Prerequisite: course 100A or consent of instructor. Principles of plant interactions with their physical and biological environments and their acquisition of the resources needed for growth and reproduction. Emphasis on how management practices and environmental conditions affect crop productivity.—III. (III.) Brown, Shackel

100CL. Environmental Interactions of Cultivated Plants Laboratory (2)

Lecture/discussion—3 hours. Prerequisite: course 100C (may be taken concurrently). Techniques and instruments used to study plant interactions with their physical and biological environments, including light responses, transpiration, microclimatology, nutrient availability and utilization, biomass accumulation. Quantitative methods and modeling are emphasized.—(III.) Shackel

101. Agriculture and the Environment (3)

Lecture—3 hours. Prerequisite: course 2 or consent of instructor. Interaction between agriculture and the environment. Focus on the interaction between agriculture and the environment to address the principles required to analyze conflict and develop solutions to complex problems facing society. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 101. (Former course Agricultural Management and Rangeland Resources 101.)—II. (II.) Phillips

102. California Floristics (5)

Lecture—3 hours; laboratory—8 hours. Prerequisite: course 2, Biological Sciences 1C, 2C, or equivalent course in Plant Sciences. Survey of the flora of California, emphasizing recognition of important vascular plant families and genera and use of taxonomic keys for species identification. Current understanding of relationships among families. Principles of plant taxonomy and phylogenetic systematics. One Saturday field trip. (Same course as Plant Biology 102.)—III. (III.) Potter

105. Concepts in Pest Management (3)

Lecture—2 hours; laboratory/discussion—3 hours. Prerequisite: Biological Sciences 1C or course 2, Chemistry 8B. Introduction to the ecological principles of integrated pest management, biology of different classes of pests and the types of losses they cause, population assessment, evaluation of advantages and disadvantages of different techniques used for pest management, IPM programs. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 105. (Former course Agricultural Management and Rangeland Resources 105.)—I. (I.)

110A. Principles of Agronomic Crop Production in Temperate and Tropical Systems (3)

Lecture—3 hours. Prerequisite: course in general botany or course 2 recommended. Fundamentals of field crop production in temperate and tropical climates. Resource utilization and economic, political and social problems are considered in relation to technological problems and their influences on agricultural development. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 110A. (Former course Agricultural Management and Rangeland Resources 110A.)—(I.) Mitchell

110B. Management of Agronomic Crops in Temperate and Tropical Systems (3)

Lecture—3 hours. Prerequisite: course in general botany or course 2; course 110A recommended. Application of agronomic principles in production of temperate and tropical crops. Specific crops dis-

cussed with reference to management and efficient use of physical and biological resources. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 110B. (Former course Agricultural Management and Rangeland Resources 110B.)

110C. Crop Management Systems for Vegetable Production (4)
Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 2; course 110A recommended. Horticultural principles applied to production and management systems for vegetable crops. Laboratory and discussion will illustrate efficient field management and resource use practices. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 110C. (Former course Agricultural Management and Rangeland Resources 110C.)—I. Mitchell

110L. Principles of Agronomy Laboratory (1)
Laboratory—3 hours. Prerequisite: course 110B (may be taken concurrently). Field-oriented introduction to principles of agronomic crop production. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 110L. (Former course Agricultural Management and Rangeland Resources 110L.)—(I.) Mitchell

112. Forage Crop Ecology (3)
Lecture—3 hours. Prerequisite: course 2, Biological Sciences 1C, 2C, or consent of instructor. Forages as a world resource in food production. Ecological principles governing the adaptation, establishment, growth and management of perennial and annual forages, including pastures, rangelands and hay; aspects of forage quality which affect feeding value to livestock. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 112. (Former course Agricultural Management and Rangeland Resources 112.) Offered in alternate years.—III. Teuber

113. Biological Applications in Fruit Tree Management (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C, 2C or equivalent. Physiology, growth, development and environmental requirements of fruit trees and the cultural practices used to maintain them. Emphasis on the application of biological principles in the culture of commercially important temperate zone fruit tree species. Not open for credit to students that have completed Plant Biology 173. (Former course Plant Biology 173.)—II. (II.) DeJong

114. Biological Applications in Fruit Production (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C or 2C; course 113. Reproductive biology of tree crop species. Biological principles of fruit production, tree nutrition and orchard management for optimizing cropping. Laboratories emphasize hands-on work with orchard tree systems that are done specifically to produce the crop. Not open for credit to students who have completed Plant Biology 174. (Former course Plant Biology 174.)—III. (III.) DeJong

120. Applied Statistics in Agricultural Science (4)
Lecture—3 hours; discussion/laboratory—3 hours. Prerequisite: upper division standing. Application of statistical methods to design and analysis of research trials for plant, animal, behavioral, nutritional, and consumer sciences. Basic concepts and statistical methods are presented in lectures, laboratories emphasize data processing techniques, problem solving, and interpretation in specialized fields. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 120. (Former course Agricultural Management and Rangeland Resources 120.) GE credit: SciEng.—I. (I.) Medrano, Teuber

130. Rangelands: Ecology, Conservation and Restoration (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1C; introductory ecology course and junior standing recommended. Introduction to the ecological principles and processes important for an understanding of the dynamics of range ecosystems. Emphasis on ecological and evolutionary concepts underlying management strategies for conserving biological diversity and environmental quality in rangelands. Offered in alternate years. GE credit: SciEng, Wrt. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 130. (Former course Agricultural Management and Rangeland Resources 130.)—(II.) Rice

131. Identification and Ecology of Grasses (2)
Lecture—7.5 hours; laboratory—20 hours; discussion—5 hours. Prerequisite: Biological Sciences 1C or course 2; Plant Biology 102 and junior standing recommended. Taxonomy and identification of western grasses. Development of skills in using plant identification keys. Ecology and evolution of grasses in grazing ecosystems. Given the week following spring quarter. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 131. (Former course Agricultural Management and Rangeland Resources 131.) Offered in alternate years.—III. Rice

135. Ecology and Community Structure of Grassland and Savannah Herbivores (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A or 1B and course 2, or Biological Sciences 1C; general ecology course (Environmental Science and Policy 100) recommended. Feeding ecology of grassland herbivores and its importance in evolution of herbivore communities and social systems. Optimal foraging, interspecific interactions, and primary productivity are considered as factors structuring natural and managed grassland and savannah systems. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 135. (Former course Agricultural Management and Rangeland Resources 135.)—(I.) Demment

141. Ethnobotany (4)
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: course 2, Biological Sciences 1C or 2C. Relationships and interactions between plants and people, including human perceptions, management, and uses of plants, influences of plants on human cultures, and effects of human activity on plant ecology and evolution. Concepts, questions, methods, and ethical considerations in ethnobotanical research. Not open for credit to students who have completed Plant Biology 141. (Former course Plant Biology 141.) Offered in alternate years. GE Credit: SciEng or SocSci, Wrt.—II. Potter

142. Ecology of Crop Systems (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Sciences 2 or Biological Sciences 1C or 2C; Mathematics 16A or Physics 1A, or consent of instructor. Ecological processes governing the structure and behavior of managed ecosystems. Emphasis on mechanistic and systems views of the physical environment, photosynthetic productivity, competition, adaptation, nutrient cycling, energy relations and contemporary issues such as climate change. Not open for credit to students who have completed Plant Biology 142. (Former course Plant Biology 142.) GE Credit: SciEng.

144. Trees and Forests (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or Biological Sciences 1C or 2C. Biological structure and function of trees as organisms; understanding of forests as communities and as ecosystems; use of forests by humans; tree phenology, photosynthesis, respiration, soil processes, life histories, dormancy, forest biodiversity, and agroforestry. Not open for credit to students who have completed Plant Biology 144 or Environmental Horticulture 144. (Former course Plant Biology/Environmental Horticulture 144.) (Same course as Environmental and Resource Sciences 144).—I. (I.) Berry, Dahlgren, Rice

145. Sierra Nevada Flora (3)
Lecture/laboratory—3 hours; fieldwork—5 hours. Prerequisite: Plant Biology 102 or 108 or Evolution and Ecology 121 or Environmental Horticulture 105. An introduction to the flora of the Sierra Nevada. Basic plant identification, the principal plant communities and species of the Sierra Nevada. Class offered the first two weeks in July in the Sierra Nevada. Offered in alternate years. Not open for credit to students who have completed Plant Biology 145. (Former course Plant Biology 145.)

150. Sustainability and Agroecosystem Management (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Soil Science 10, Chemistry 2A, and course 2, Biological Sciences 1C or 2C. Interdisciplinary analysis of agricultural production and food systems with primary emphasis on biophysical processes. General concepts governing the functioning of temperate and tropical agroecosystems in relation to resource availability, ecological sustainability, and socio-economic viability. Comparative ecological analyses of agroecosystems. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 150. (Former course Agricultural Management and Rangeland Resources 150.)—III. (III.) Six

152. Plant Genetics (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: Biological Sciences 1A or 2A or consent of instructor. Basic principles of transmission genetics, cytogenetics, population and quantitative genetics, and molecular genetics. Practical aspects of genetic crosses and analysis of segregating populations. Not open to students who have completed Plant Biology 152. (Former course Plant Biology 152.)—I. (I.) Beckles

153. Plant, Cell, Tissue and Organ Culture (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2 or Biological Sciences 1C or 2C. Basic and applied aspects of plant tissue culture including media preparation, micropropagation, organogenesis, embryogenesis, anther culture, protoplast culture and transformation. Not open for credit to students who have completed Plant Biology 153. (Former course Plant Biology 153.)

154. Introduction to Plant Breeding (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 152, Biological Sciences 101 or consent of instructor. The principles, methods and applications of plant breeding and genetics to the improvement of crop plants. Illustration of how plant breeding is a dynamic, multidisciplinary, constantly-evolving science. Laboratory emphasizes hands-on experience in the basics of breeding through experiments. Not open for credit to students who have completed Plant Biology 154. (Former course Plant Biology 154.)—II. (II.) St. Clair

157. Physiology of Environmental Stresses in Plants (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: course 100C or Plant Biology 111 or 112 or Environmental Horticulture 102 or Viticulture and Enology 110. Stress concepts and principles; molecular, physiological, developmental and morphological characteristics enabling plants to avoid or tolerate environmental stresses; stress acclimation and adaptation processes; responses of wild and cultivated species to drought, flooding, nutrient deficiencies, salinity, toxic ions, extreme temperatures, etc. Not open for credit to students who have completed Plant Biology 157. (Former course Plant Biology 157.)

158. Mineral Nutrition of Plants (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100A or Plant Biology 111 or Environmental Horticulture 102 or Viticulture and Enology 110. Evolution and scope of plant nutrition; essential elements; mechanisms of absorption and membrane transporters; translocation and allocation processes; mineral metabolism; deficiencies and toxicities; genetic variation in plant nutrition; applications to management and understanding ecological effects of nutrient availability or deficiency. Not open for credit to students who have completed Plant Biology 158. (Former course Plant Biology 158.)—III. Brown, Richards

160. Agroforestry: Global and Local Perspectives (3)
Lecture/discussion—3 hours. Prerequisite: course 2 or Biological Sciences 1C; Plant Biology 142 or a general ecology course (Environmental Science and Policy 100). Traditional and evolving use of trees in agricultural ecosystems; their multiple roles in environmental stabilization and production of food, fuel, and fiber; and socioeconomic barriers to the adoption and implementation of agroforestry practices. Not open for credit to students who have taken Agricultural Management and Rangeland Resources 160. (Same course as International Agricultural Development 160.) Offered in alternate years.—I. Gradziel

162. Urban Ecology (3)
Lecture/discussion—3 hours. Prerequisite: a course in general or plant ecology (course 142, Plant Biology 117 Environmental Science and Policy 100, or Evolution and Ecology 101). Application of fundamental concepts and approaches in landscape and ecosystem ecology to urban ecosystems. Ecological and social drivers and responses. Landscape heterogeneity, nutrient dynamics, invasive species, altered hydrology and climate, and pollution. Discussion of primary literature.—II. (II.) Cadenasso

163. Ecosystem and Landscape Ecology (4)
Lecture/discussion—4 hours. Prerequisite: course in general, plant, or soil ecology; Evolution and Ecology 117, Plant Biology 117, Environmental Science and Policy 100, Evolution and Ecology 101, Soil Science 112. Integration of concepts to understand and manage ecosystems in a complex and changing world. Emphasis on interactions among biotic, abiotic and human factors and changes over space/time. Local to global controls over water, carbon and nutrients across ecosystems/landscapes. Not open for credit to students who have completed Ecology 201.—II. (II.) Cadenasso, Eviner

170A. Fruit and Nut Cropping Systems (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C, or consent of instructor. Overview of production and handling systems of major pomological crops, analysis of current cultural and harvesting problems and concerns associated with commercial fruit growing. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 170A. (Former course Agricultural Management and Rangeland Resources 170A.) Offered in alternate years.—(I.) Gradziel

170B. Fruit and Nut Cropping Systems (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C, or consent of instructor. Overview of production and handling systems of major pomological crops, including analysis of current cultural and harvesting problems and concerns associated with commercial fruit growing. Not open for credit to students who have completed Agricultural Management and Rangeland Resources 170B. (Former course Agricultural Management and Rangeland Resources 170B.) Offered in alternate years.—(III.) Gradziel

171. Principles and Practices of Plant Propagation (4)
Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2, Biological Sciences 1C or 2C. Principles and practices of propagating plants covering anatomical, physiological, and practical aspects. Not open for credit to students who have completed Plant Biology 171. (Former course Plant Biology 171.)—III. (III.) Burger

172. Postharvest Physiology and Technology (4)
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: general plant science background (e.g., courses 2, 12); course 196 recommended. Overview of physiological processes related to maturation and senescence of plant products and their responses to postharvest stresses. Targeted approaches and technologies to maintain product quality and limit postharvest disorders. Not open for credit to students who have completed Plant Biology 172. (Former course Plant Biology 172.)—I. (I.) Negre-Zakharov, Saltveit

173. Molecular and Cellular Aspects of Postharvest Biology (3)
Lecture/discussion—3 hours. Prerequisite: course 2, Biological Sciences 1C, 2C or equivalent. Basic concepts and current knowledge of issues relevant to postharvest biology. Mechanisms of fruit ripening, senescence, programmed cell death. Metabolism and functions of phytohormones, carbohydrates, lipids, pigments, flavor compounds, and phytonutrients at molecular and cellular levels.—III. (III.) Zakharov

174. Microbiology and Safety of Fresh Fruits and Vegetables (3)
Lecture—3 hours. Prerequisite: course 2 or Biological Sciences 1C or 2C or equivalent. Overview of microorganisms on fresh produce, pre- and postharvest factors influencing risk of microbial contamination, attachment of microorganisms to produce, multiplication during postharvest handling and storage, and methods of detection. Mock outbreak trial and presentation of science-based forensic discovery.—I. (I.)

176. Introduction to Weed Science (3)
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 2 or Biological Sciences 1C or 2C. Principles of weed science including: Weed biology and ecology, methods of weed management, biological control, herbicides and herbicide resistance. Weed control in managed and natural ecosystems; invasive species. Laws and regulations. Application of herbicides. Sight identification of common weeds. Not open for credit to students who have completed Plant Biology 176. (Former course Plant Biology 176.)—II. (II.) DiTomaso, Fischer

178. Biology and Management of Aquatic Plants (3)
Lecture—3 hours. Prerequisite: course 2, Biological Sciences 1C or 2C; Chemistry 8B or 118B; course 100C, Plant Biology 111, Environmental Horticulture 102, or Hydrologic Science 122 recommended. Brief survey of common and invasive fresh water plants and macroalgae, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (hormonal interactions), ecology, modes and impacts of invasion, and management. Two Saturday field trips required. Offered in alternate years. Not open for credit to students who have completed former course Plant Biology 178. (Former course Plant Biology 178.)—I. Anderson

180. Introduction to Geographic Information Systems (4)
Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 21 or equivalent familiarity with computers, course 120 or the equivalent, Mathematics 16A. Management and analysis of georeferenced data. Spatial database management and modeling. Applications to agriculture, biological resource management and social sciences. Cartographic modeling. Vector and raster-based geographic information systems. Not open for credit to students who have completed Agriculture Systems and Environment 132 or Agricultural Management and Rangeland Resources 132 or 180. (Former course Agricultural Management and Rangeland Resources 180.) (Same course as Applied Biological Systems Technology 180.)

188. Undergraduate Research Proposal (3)
Lecture/discussion—3 hours. Prerequisite: upper division standing. Preparation and review of a scientific proposal. Problem definition, identification of objectives, literature survey, hypothesis generation, design of experiments, data analysis planning, proposal outline and preparation. (Same course as Biotechnology 188.) GE Credit: Wrt.—III. (III.) Kliebenstein

189L. Laboratory Research in Plant Sciences (2-5)
Laboratory—3-12 hours; discussion—1 hour. Prerequisite: course 188 and consent of instructor. Formulating experimental approaches to current questions in Plant Sciences; performance of proposed experiments. May be repeated up to 12 units for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

190. Seminar on Alternatives in Agriculture (2)
Seminar—2 hours. Prerequisite: upper division standing. Seminar on topics related to alternative theories, practices and systems of agriculture and the relationship of agriculture to the environment and society. Scientific, technological, social, political and economic perspectives. May be repeated for credit. (Former course Agricultural Management and Rangeland Resources 190.) (P/NP grading only.)—II. (II.) Van Horn

190C. Research Group Conference (1)
Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in the plant sciences. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience on or off campus in subject areas pertaining to plant and environmental sciences. Internship supervised by a faculty member. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

194H. Senior Honors Thesis (2-6)
Independent study. Prerequisite: senior standing; overall GPA of 3.250 or higher and consent of master adviser. Two or three successive quarters of guided research on a subject of special interest to the student. (P/NP grading only; deferred grading only, pending completion of thesis.)

196. Postharvest Technology of Horticultural Crops (3)
Lecture/discussion—45 hours; fieldwork—45 hours. Prerequisite: upper division or graduate student standing. Intensive study of postharvest considerations and current procedures and challenges in postharvest handling for fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks immediately following last day of spring quarter. Not open for credit to students who have completed Plant Biology 196. (Former course Plant Biology 196.) (P/NP grading only.)—III. (III.) Mitcham

197T. Tutoring in Plant Sciences (1-5)
Tutorial—1-5 hours. Prerequisite: upper division standing, completion of course being tutored or the equivalent, consent of instructor. Leading small voluntary discussion or lab groups affiliated with one of the department's regular courses. May be repeated for up to eight units of credit. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

Graduate Courses

205. Experimental Design and Analysis (5)
Lecture—3 hours; discussion/laboratory—2 hours. Prerequisite: course 120 or equivalent. Introduction to the research process and statistical methods to plan, conduct and interpret experiments. Not open for credit to students who have completed Agronomy 205. (Former course Agronomy 205.)—II. (II.) Dubcovsky

206. Applied Multivariate Modeling in Agricultural and Environmental Sciences (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: one of course 120, Statistics 106, 108, course 205 or equivalent. Multivariate linear and nonlinear models. Model selection and parameter estimation. Analysis of manipulative and observational agroecological experiments. Discriminant, principal component, and path analyses. Logistic and biased regression. Bootstrapping. Exercises based on actual research by UC Davis students. Not open for credit to students who have complete Agronomy 206. (Former course Agronomy 206.)—I. (I.) Laca

211. Principles and Practices of HPLC (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: undergraduate physics and chemistry; Biological Sciences 102, 103 recommended. Principles and theory of HPLC involving various modes of separation and detection. Optimization of separation using isocratic and gradient elution. Develop practical knowledge about the use, maintenance and troubleshooting of HPLC equipment, including HPLC columns. Development of new HPLC methods. Not open for credit to students who have completed Agronomy 211. (Former course Agronomy 211.)

212. Postharvest Biology and Biotechnology of Fruits and Nuts (3)
Lecture—3 hours. Prerequisite: course 172. Review of postharvest biology of fruits and nuts and biotechnological approaches to address postharvest challenges. Morphology, biology and postharvest handling of fruits and nuts are presented along with current research, including biotechnology, and discussion of future research needs and approaches. Offered in alternate years. Not open for credit to students who have completed Pomology 212.—(III.) Mitcham, Zakharov

213. Postharvest Physiology of Vegetables (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 172 or course 100B or Plant Biology 112. Comparative physiology of harvest vegetables; emphasis on maturation, senescence, compositional changes, physiological disorders and effects of environmental factors. Concepts and research procedures. Not open for credit to students who have completed Vegetable Crops 212. (Former course Vegetable Crops 212.) Offered in alternate years.—(III.) Saltveit

220. Genomics and Biotechnology of Plant Improvement (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101 or the equivalent. Integration of modern biotechnology and classical plant breeding including the impact of structural, comparative and functional genomics on gene discovery, characterization and exploitation. Also covers molecular markers, plant transformation, hybrid production, disease resistance, and novel output traits. Not open for credit to students who have completed Vegetable Crops 220. (Former course Vegetable Crops 220.) (Same course as Genetics 220.)—Michelmore

221. Genomics and Breeding of Vegetable Crops (3)
Lecture—3 hours. Prerequisite: Biological Sciences 101 or equivalent. Preview of genome structure, mapping, gene tagging and development of other genetic resources applied to improvement of major vegetables. For graduate students contemplating a career in modern vegetable breeding and biotechnology. Not open for credit to students who have completed Vegetable Crops 221. (Former course Vegetable Crops 221.)—III. (III.) Quiros

222. Advanced Plant Breeding (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 205; Genetics Graduate Group 201D or Animal Genetics 107; Plant Biology 154. Philosophy, methods, and problems in developing improved plant species. Topics include: inbreeding, heterosis, progeny testing, breeding methodology, index selection, germplasm conservation, and breeding for stress resistance. Laboratories include tours of breeding facilities and calculation and interpretation of quantitative data. Not open for credit to students who have completed Agronomy 221. (Former course Agronomy 221.) Offered in alternate years.—(III.) Teuber

290. Seminar (1-2)
Seminar—1-2 hours. Topics of current interest related to Plant Sciences. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Research Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. (S/U grading only.)—I, II, III. (I, II, III.)

297T. Tutoring in Plant Science (1-5)
Tutoring—1-5 hours. Prerequisite: graduate standing; consent of instructor; completion of course to be tutored or the equivalent. Designed for graduate students who desire teaching experience but are not teaching assistants. May be repeated for credit for a total of five units. Same course may not be tutored more than once. (S/U grading only.)

298. Group Study (1-5)

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: consent of instructor; graduate standing. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.)

Plastic Surgery

See Medicine, School of, on page 380.

Political Science

(College of Letters and Science)

Walter J. Stone, Ph.D., Interim Chairperson of the Department

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Faculty

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Larry Berman, Ph.D., Professor
Cheryl L. Boudreau, Ph.D, Assistant Professor
Amber Boydston, Ph.D., Assistant Professor
Erik Engstrom, Ph.D., Associate Professor
Scott S. Gartner, Ph.D., Professor
John B. Gates, Ph.D., Associate Professor
Stephen Haptonstahl, Ph.D., Assistant Professor
Benjamin Highton, Ph.D., Associate Professor
Stuart L. Hill, Ph.D., Associate Professor
Robert Huckfeldt, Ph.D., Professor
Bradford S. Jones, Ph.D., Associate Professor
Kyle Joyce, Ph.D., Assistant Professor
Daniel Y. Kono, Ph.D., Associate Professor
Scott MacKenzie, Ph.D., Assistant Professor
Zeev Maoz, Ph.D., Professor
Heather McKibbens, Ph.D., Assistant Professor
Jeannette Money, Ph.D., Associate Professor
Gabriella R. Montinola, Ph.D., Associate Professor
Miroslav Nincic, Ph.D., Professor
Ethan Scheiner, Ph.D., Associate Professor
John T. Scott, Ph.D., Professor
Walter J. Stone, Ph.D., Professor
Robert S. Taylor, Ph.D., Associate Professor

Emeriti Faculty

Edmond Costantini, Ph.D., Professor Emeritus
Richard W. Gable, Ph.D., Professor Emeritus
Alexander J. Groth, Ph.D., Professor Emeritus
Clyde E. Jacobs, Ph.D., Professor Emeritus
Joyce K. Kallgren, Ph.D., Professor Emerita
Lloyd D. Musolf, Ph.D., Professor Emeritus
John R. Owens, Ph.D., Professor Emeritus
Randolph M. Siverson, Ph.D., Research Professor and Professor Emeritus
Larry L. Wade, Ph.D., Professor Emeritus
Geoffrey A. Wandesforde-Smith, Ph.D., Professor Emeritus
Paul E. Zinner, Ph.D., Professor Emeritus

The Major Program

Political science is the study of politics and political systems at the local, national, and international levels. It concerns not only the institutions of government but also the analysis of such phenomena as political behavior, political values, political change and stability, parties, pressure groups, bureaucracies, administrative behavior, justice, national security, and international affairs.

The Program. The Department of Political Science offers two major programs: political science and political science-public service. The political science major aims to provide the student with a broad understanding of political concepts, political institutions, political behavior, and political processes. The political science-public service major is for students who desire opportunities for practical hands-on experience in their major. It differs in particular from the political science major in its internship requirement and its focus on the American political system.

Internships and Career Alternatives. Both the proximity of UC Davis to the state capitol and the programs offered by the UC Davis Washington Center afford exceptional internship possibilities in local, state, and national government offices, providing students with actual experience in politics and government service while still attending school. A student who majors in political science acquires research and analytic skills relevant to many professional fields. Consequently, the majors offered in political science are valuable not only in providing students with a better understanding of politics and political systems, but also as a first step toward careers in teaching, law, management, government, urban planning, journalism, politics, administration, or for graduate studies in numerous fields.

Political Science

A.B. Major Requirements:

UNITS

Preparatory Subject Matter.....28
Three lower division Political Science courses from: 1, 2, 3, 4 12
Political Science 51 (required course)..... 4
Statistics 13, 32, 102 (or equivalent) 4
One course from Economics 1A, Economics 1B or Philosophy 5..... 4
One course from History 4C, 8, 9A, 10C, 15, 17A or 17 B 4

Depth Subject Matter 44-45
Four courses in one of the fields of concentration listed below..... 16
Three courses in another field of concentration listed below..... 12
Two courses in another field of concentration listed below..... 8
Two other upper division courses in Political Science. Only 5 units of Political Science 192 may be counted toward the depth subject matter.....8-9

Fields of Concentration

American Politics (courses with Political Science 1 as a prerequisite): Political Science 100, 102, 104-109, 150-155, 160, 162-166, 168, 170-172, 174-176, 180, 183, 187, 195, 196A.

Comparative Politics (courses with Political Science 2 as a prerequisite): Political Science 126, 140A-140C, 142A-142B, 143A-143B, 144A-144B, 146A-146B, 147A-147D, 148A-148C, 179, 196B.

International Relations (courses with Political Science 3 as a prerequisite): Political Science 120-124, 126, 129, 130-132, 134-137, 139, 190, 196C, International Relations 131.

Political Theory (courses with Political Science 4 as a prerequisite): Political Science 110, 112-117, 118A-118C, 119, 187, 196D

Total Units for the Major 72-73

Political Science—Public Service

A.B. Major Requirements:

UNITS

Preparatory Subject Matter..... 20

Political Science 1 4
Two courses from Political Science 2, 3, 4, 5 or 7 8
Statistics 13 (or equivalent)..... 4
Political Science 51 (required course) 4
Recommended: Economics 1A-1B

Depth Subject Matter 44-46

Core program..... 12
Three courses chosen from Political Science 100, 102, 104, 105, 106, 108, 109, 113, 114, 180.
Internship, Political Science 192A, 192B, or 192W 6
Research paper, Political Science 193 ... 2-4
Fields of concentration 24
Select six upper division courses from two or three fields of concentration listed below with at least two courses in each field selected; at least 16 of the units must be in political science; Core Program courses may not be counted toward this requirement.

Fields of Concentration

Field (1) Policy Process: Political Science 100, 102, 104, 105, 106, 108, 109, 140A, 160, 162, 163, 164, 165, 166, 168, 170, 171, 172, 174, 175, 180, 183, 187, 195; Economics 130, 131
Field (2) Policy Interpretation (public/pre-law): Political Science 119, 150, 151, 152, 153, 155
Field (3) State & Local Policy: Political Science 100, 102, 104; Environmental Science and Policy 173; Sociology 143A
Field (4) Foreign Policy: Political Science 122, 130, 131, 132, 134, 139
Field (5) Environmental Policy: Political Science 107; Environmental Science and Policy 160, 161, 162, 166, 168A, 168B, 169, 171, 172, 173, 179
Field (6) Economic Policy: Economics 100, 130, 131, 151A, 151B
Field (7) Social Policy: Sociology 104, 124, 141, 150, 151, 154, 155, 175, 181
Field (8) Policy Analysis Tools: Economics 102, 140; Political Science 114

Total Units for the Major 64-66

Major Advisers. Consult Department office.

Minor Program Requirements:

Students electing a minor in Political Science may choose one of two plans.

UNITS

Political Science 24

Six upper division courses: Three courses in one of the fields of concentration and three courses outside of that field.

Public Affairs Internship Program. This program is open to upper division students in any major who want to obtain an internship in the area of government and public service. Information and applications are available from the Political Science Department in 1273 Social Sciences and Humanities Building.

Graduate Study. The Department of Political Science offers a program of graduate study and research leading to a Ph.D. degree or an M.A./J.D. joint degree. The M.A./J.D. joint degree is done only in conjunction with UC Davis School of Law. Information concerning admission to these programs and requirements for completion are available in the Graduate Program Coordinator office.

Graduate Adviser. Consult Graduate Program Coordinator office.

American History and Institutions. This University requirement may be satisfied by passing any one of the following Political Science courses: 1, 5, 100, 102, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163; see also under University requirements.

Courses in Political Science (POL)

Lower Division Courses

1. American National Government (4)
Lecture—3 hours; discussion—1 hour. Survey of American national government, including the constitutional system, political culture, parties, elections, the presidency, Congress, and the courts. GE credit: SocSci, Wrt.—I, II, III.

2. Introduction to Comparative Politics (4)
Lecture—3 hours; discussion—1 hour. Introduction to basic concepts in political analysis and application of them in comparative studies of selected countries. Coverage is given to cultural and other informal dimensions of politics as well as to more formal political and governmental structures. GE credit: SocSci, Wrt.—I, III.

3. International Relations (4)
Lecture—3 hours; discussion—1 hour. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics. GE credit: SocSci, Wrt.—I, II, III. (I, II, III.)

4. Basic Concepts in Political Theory (4)
Lecture—3 hours; discussion—1 hour. Analysis of such concepts as the individual, community, liberty, equality, justice, and natural law as developed in the works of the major political philosophers. GE credit: SocSci, Wrt.—I.

5. Contemporary Problems of the American Political System (4)
Lecture—3 hours; discussion—1 hour. In-depth treatment of selected problems and issues of American politics, governmental institutions, and policies. GE credit: SocSci, Wrt.—II.

7. Contemporary Issues in Law and Politics (4)
Seminar—4 hours. A seminar which focuses on the political dimensions of American law and institutions. Examines the role of courts in resolving contemporary issues of law and politics including abortion, capital punishment, and civil rights. Limited enrollment. Open to students having no more than 40.1 units. GE credit: SocSci, Wrt.—III.

51. Scientific Study of Politics (4)
Lecture—3 hours; discussion—1 hour. Introduction to the basic principles of the scientific study of politics. Research design and empirical analysis of data with applications to different methodological approaches and different substantive areas in political science. GE credit: SocSci.—I, II, III. (I, II, III.) Jackman

90X. Lower Division Seminar (4)
Seminar—4 hours. Prerequisite: lower division standing and consent of instructor. Examines fundamental issues and concepts that shape the study and practice of politics. Students will read, discuss and write about some of the most significant texts in political science in order to develop a foundation for the study of politics. Limited enrollment.

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Local Government and Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 and upper division standing or consent of instructor. Politics and government of local communities in the United States, including cities, counties and special districts. Emphasizes sources and varieties of community conflict, legislative and executive patterns, expertise, decision making and the politics of structure. Observation of local governing boards. Offered irregularly. GE credit: SocSci, Wrt.—Huckfeldt

102. Urban Public Policy (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, upper division standing in Political Science or consent of instructor. Political and economic relationships among central cities, suburbs, and regional, state, and federal governments. Focuses upon policy areas such as poverty, transportation, welfare, and housing, and upon who governs and who benefits from the policies in these areas. GE credit: SocSci, Wrt.

104. California State Government and Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 and upper division standing or consent of instructor. The California political system. Political culture, constitution, elections and parties, direct democracy, legislature, governor, executive branch, courts, finances, state-local relations and policy issues. Offered irregularly. GE credit: SocSci, Wrt.—Huckfeldt

105. The Legislative Process (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1. The legislative process with emphasis on the United States Congress; legislative organization and procedures, legislative leadership and policy making, legislators and constituents, relations between Congress and other agencies. GE credit: SocSci, Wrt.

106. The Presidency (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1. The American presidencies origins and development; presidential power and influence as manifest in relationships with Congress, courts, parties, and the public in the formulation and administration of foreign and domestic policy; nominations, campaigns, and elections. GE credit: SocSci, Wrt.

107. Environmental Politics and Administration (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to the environment as a political issue in the United States and to the development of administrative mechanisms for handling environmental problems. Changing role of Congress, the presidency, the bureaucracy, and the courts in environmental policy formulation and implementation. GE credit: SocSci, Wrt.

108. Policy Making in the Public Sector (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 and upper division standing or consent of instructor. Theoretical rationale for governmental activity, program evaluation, PPBS, positive theories of policy making, the quantitative study of policy determinants, implementation, and proposals for improved decision making. Offered irregularly. GE credit: SocSci, Wrt.—Huckfeldt

109. Public Policy and the Governmental Process (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1. The processes of formulating public policy, including individual and collective decision making, political exchange, competition, bargaining, coalition formation and the allocation of public goods, resources and opportunities. GE credit: SocSci, Wrt.

110. The Strategy of Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Introduction to game theory. Explanation of the behavior of individuals in strategic interaction. Rational and behavioral approaches. Applications to political science and other fields. GE Credit: SocSci, Wrt.—Huckfeldt

112. Contemporary Democratic Theory (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4. Major contemporary attempts to reformulate traditional democratic theory, attempts to replace traditional theory by conceptual models derived from modern social science findings. Offered in alternate years. GE credit: SocSci, Wrt.—Huckfeldt

113. American Political Thought (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4. Origins and nature of American political thought. Principles of American thought as they emerge from the founding period to the present. GE credit: SocSci, Wrt.—Scott

114. Quantitative Analysis of Political Data (4)
Lecture—3 hours; term paper or discussion—1 hour. Logic and methods of analyzing quantitative political data. Topics covered include central tendency, probability, correlation, and non-parametric statistics. Particular emphasis will be placed on understanding the use of statistics in political science research. Offered in alternate years. GE credit: SocSci, Wrt.

115. Medieval Political Thought (4)
Lecture—3 hours; term paper. Prerequisite: course 118A. Examination of the ideas central to medieval political thinking. Emphasis will be upon the thoughts of the major political thinkers of the period, rather than upon political history. GE credit: SocSci, Wrt.

116. Foundations of Political Thought (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4. Analysis and evaluation of the seminal works of a major political philosopher or of a major problem in political philosophy. May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: SocSci, Wrt.—Peterman

117. Topics in the History of Political Thought (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4. The political thought of a specific historical period. Topics may include: Ancient Athens, the Italian Renaissance, the Enlightenment, or Nineteenth Century Germany. May be repeated once for credit. GE credit: Wrt.

118A. History of Political Theory: Ancient (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4. Critical analyses of classical and medieval political philosophers such as Plato, Aristotle, Cicero and St. Thomas. GE credit: SocSci, Wrt.—Peterman

118B. History of Political Theory: Early Modern (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4. Critical analysis of the works of early modern political philosophers such as Machiavelli, Montaigne, Hobbes, Locke and Hume. GE credit: SocSci, Wrt.—Scott

118C. History of Political Theory: Late Modern (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4. Critical analyses of the works of late modern political philosophers such as Rousseau, Kant, Hegel, Tocqueville, Mill, Marx and Nietzsche. GE credit: SocSci, Wrt.—Scott

119. Contemporary Political Thought (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 4. Contemporary political thought from the end of the nineteenth century to the present. Emphasis upon an individual philosopher, concept, or philosophical movement; e.g., Nietzsche, Continental political thought, Rawls and critics, theories of distributive justice, feminist theory. Offered irregularly. GE credit: SocSci, Wrt.—Peterman

120. Theories of International Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3, upper division standing or consent of instructor. Major contemporary approaches to the study of international politics, including balance of power, game theory, Marxist-Leninist theory, systems theory, and decision-making analysis. GE credit: SocSci, Wrt.

121. Scientific Study of War (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3; course 51 or Statistics 13 with upper division standing. Restricted to upper division standing. An analysis of political processes involved in the initiation, conduct and termination of modern interstate warfare. GE credit: SocSci, Wrt.—Gartner

122. International Law (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3. Selected topics in international law; territory, sovereign immunity, responsibility, the peaceful settlement or nonsettlement of international disputes. GE credit: SocSci, Wrt.

123. The Politics of Interdependence (4)
LLecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3, upper division standing or consent of instructor. In the past several decades, growing economic interdependence has generated new problems in international relations. Course deals with difficulties in managing complex interdependence and its implication on national policies and politics. GE credit: SocSci, Wrt.

124. The Politics of Global Inequality (4)
Lecture—3 hours; term paper. Prerequisite: course 3, upper division standing; course 123 recommended. Long-standing division of the global system into richer and poorer regions poses many important problems in international political economy. Course presents a theoretical background to North-South issues and analyses of current problems in economic and political relations. GE credit: SocSci, Div, Wrt.—I, III.

126. Ethnic Self-Determination and International Conflict (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3. Compares the claims of the state and ethnic peoples in countries undergoing internal conflicts; e.g., South Africa, Northern Ireland. Analyzes the role of the international community in facilitating the peaceful resolution of conflicts. GE credit: SocSci, Div, Wrt.

129. Special Studies in International Politics (4)
Lecture—3 hours; term paper. Prerequisite: course 3, upper division standing. Intensive examination of one or more special problems in international politics. May be repeated one time for credit when different topic is studied. GE credit: SocSci, Wrt.—II.

130. Recent U.S. Foreign Policy (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3, upper division standing or consent of instructor. Broad survey of the development of U.S. foreign policy in twentieth century with emphasis on transformation of policy during and after World War II, and the introduction to analytic tools and concepts useful for understanding of current foreign policy issues. GE credit: SocSci, Wrt.

131. Analysis of U.S. Foreign Policy (4)
Lecture—3 hours; term paper. Prerequisite: course 3, upper division standing or consent of instructor. Detailed presentation and examination of the formulation of execution of U.S. foreign policy. Survey of numerous factors influencing policy outcomes and how such determinants vary according to policy issue areas. GE credit: SocSci, Wrt.

132. National Security Policy (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3, upper division standing. Development of national security policies since 1945. Analysis of deterrence and assumptions upon which it is based. Effects of nuclear weapons upon conduct of war, alliance systems, and the international system. Prospects of security and stability through arms control. GE credit: SocSci, Wrt.

134. Africa and U.S. Foreign Policy (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor; upper division standing. Overview of American foreign policy toward Africa. Relationship to global adversaries. Legacies of colonialism. Challenge of national self-determination and white racism. Policies on non-alignment, producer cartels, multinational corporations, continental integration and trade and aid relations.—I.

135. International Politics of the Middle East (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 or consent of instructor. Restricted to upper division standing. International politics of the Middle East as a microcosm of world politics. The Middle East as a regional system. Domestic and International Politics in the Middle East. Changing Political Structures in the Middle East. Superpower involvement in the Middle East. GE credit: SocSci, Wrt.—Maoz

136. The Arab-Israeli Conflict (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3 or International Relations 1. Restricted to upper division standing. Causes, course, and implications of Arab-Israeli conflict. Competing Israeli and Arab narratives, politics of force, diplomacy. Domestic politics and A-I conflict, the superpowers and the A-I conflict, A-I conflict and world politics, potential solutions. GE credit: SocSci, Wrt.—Maoz

137. International Relations in Western Europe (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 3, upper division standing. Analysis of European unity, problems of the Atlantic alliance, Atlantic political economy, East-West relations, communism in Western Europe and the relationship between domestic politics and foreign policy. GE Credit: SocSci, Wrt.

139. Special Studies in Foreign Policy (4)
Lecture—3 hours; term paper. Prerequisite: course 3, upper division standing or consent of instructor. Extensive examination of one or more special problems in foreign policy. May be repeated one time for credit when topic differs.

140A. Comparative Political Institutions: Electoral Systems (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2. Workings of electoral institutions, focusing on systems used to elect presidents and assemblies, pass laws, and generally make decisions. Examples from systems throughout the world, including cases from both the advanced industrial and developing worlds. Offered in alternate years. GE Credit: SocSci, Wrt.—Scheiner

140B. Comparative Political Institutions: Parties (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor. Restricted to upper division standing. The factors shaping political parties and their role in democratic representation. Offered in alternate years. GE Credit: Div, SocSci, Wrt.—Adams, Andrews

140C. Comparative Political Institutions: Legislatures (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; upper division standing. Examination of legislatures from a comparative perspective. GE Credit: SocSci, Wrt. Offered in alternate years.—Andrews

142A. Comparative Development: Political Development in Modernizing Societies (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; upper division standing. Nature and sequence of political development; its economic and social concomitants; role of elites, military, bureaucracy, and party systems; social stratification and group politics; social mobilization and political participation; instability, violence, and the politics of integration. Offered in alternate years. GE Credit: SocSci, Wrt.—Jackman

142B. Comparative Development: Politics and Inequality (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; upper division standing. Linkages between politics and the distribution of social and economic goods. Impact of civil rights legislation, the politics of welfare states, and the effects of political participation on the distribution of goods. Offered in alternate years. GE Credit: SocSci, Wrt.—Jackman

143A. Latin American Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2. Issues related to democratic consolidation in Latin America, with a regional focus on South America. Topics include transitions to democracy, the role of the military, political economy, and political behavior. GE Credit: Div, SocSci, Wrt.—Huckfeldt

143B. Mexican Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2. Introduction to the politics of contemporary Mexico. Focus on rise, fall, and aftermath of Mexico's one-party dominant system. GE credit: Div, SocSci, Wrt.—Huckfeldt

144A. Politics of Post-Communist Countries: East European Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; restricted to upper division standing. Post-war democratization, state-building and economic reform in East European states. GE Credit: SocSci, Wrt.—Andrews

144B. Politics of Post-Communist Countries: Russia (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; restricted to upper division standing. Democratization, state-building and economic reform; creation of new institutions; impacts of Soviet rule. GE Credit: SocSci, Wrt.—Andrews

146A. Politics of Africa: Issues in Contemporary African Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; course 134 recommended; upper division standing. African politics since the end of the Cold War. Topics include: Strategic Security Approach, Democratization, Human Rights, HIV/AIDS, African Peacekeeping, Terrorism, Religious and Ethnic Conflict, Debt and Stalled Development. Offered in alternate years. GE Credit: Div, SocSci, Wrt.—Huckfeldt

146B. Politics of Africa: Development in Africa (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; course 134 recommended; upper division standing. Political and economic development within Sub-Saharan Africa. States and institutions, democracy, party systems, military coups/rule, bureaucracy/corruption, race/ethnicity, national/regional integrations, trade unions, economic development strategies, class formation, and women's roles and ideology. Offered in alternate years. GE Credit: Div, SocSci, Wrt.—Huckfeldt

147A. West European Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; upper division standing. The evolution, politics, and contemporary problems of selected political systems of Western Europe. Offered in alternate years. GE credit: SocSci, Wrt.—Money

147B. West European Politics: British Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; upper division standing. The evolution, politics, and contemporary problems of Britain's political system. GE credit: SocSci, Wrt.—Adams

147C. West European Politics: French Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; upper division standing. The evolution, politics and contemporary problems of France's political system. Offered in alternate years. GE Credit: SocSci, Wrt.—Adams

147D. West European Politics: German Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; open to upper division Political Science & International Relations Majors. Evolution, politics and contemporary problems of Germany's political system. GE Credit: SocSci, Wrt.—Adams

148A. Government and Politics of East Asia: China (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; upper division standing. Evolution of political institutions and political culture in China with emphasis on the post-1949 period. Primary attention to nationalism, modernization and political efficacy. Offered in alternate years. GE credit: SocSci, Wrt.—Montinola

148B. Government and Politics in East Asia: Japan (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; upper division standing. Japanese politics, with an emphasis on the postwar period. Particular emphasis on political parties, elections, political economy, and social problems. Offered in alternate years. GE Credit: Div, SocSci, Wrt.—Scheiner

148C. Government and Politics in East Asia: Southeast Asia (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2 or consent of instructor; upper division standing. Evolution of political institutions and economy of selected nations in Southeast Asia. Emphasis on imperialist legacy, nation building in multi-ethnic communities, and contrasts in economic performance. Offered in alternate years. GE Credit: Div, SocSci, Wrt.—Montinola

150. Judicial Politics and Constitutional Interpretation (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 and upper division standing or consent of instructor. Politics of judicial policy making, issues surrounding constitutional interpretation and decision making, prerequisite for courses on the politics of constitutional law. GE credit: SocSci, Wrt.—Gates

151. The Constitutional Politics of the First Amendment and the Right to Privacy (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: courses 1 and 150 with upper division standing or consent of instructor. The constitutional politics surrounding such issues as the right to free expression, associational rights, the right to free exercise of religious beliefs and the right to privacy. GE credit: SocSci, Wrt.—Gates

152. The Constitutional Politics of Equality (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: courses1 and 150 with upper division standing or consent of instructor. Constitutional politics of equality in the American political system; issues surrounding constitutional doctrine and judicial policymaking; special attention on racial and sexual equality. Offered in alternate years. GE credit: SocSci, Wrt.—Gates

153. The Constitutional Politics of the Justice System (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 150 with upper division standing or consent of instructor. Constitutional politics of the American criminal justice system. Issues surrounding constitutional doctrine and judicial policymaking on issues such as search and seizure. Arrest, trial, incarceration and other issues of due process. Offered in alternate years. GE credit: SocSci, Wrt.—Huckfeldt

154. Legal Philosophy (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 or 4, upper division standing or consent of instructor. Analysis of the behavior of judges and courts in the political process. Techniques of judicial decision making. Relationships among courts and other decision making bodies. Offered irregularly. GE credit: SocSci, Wrt.—Huckfeldt

155. Judicial Process and Behavior (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, upper division standing. Analysis of the behavior of judges and courts in the political process. Techniques of judicial decision making. Relationships among courts and other decisionmaking bodies. Offered in alternate years. GE credit: SocSci, Wrt.

160. American Political Parties (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, upper division standing or consent of instructor. Analysis of the structured operations of the party system in the United States; party functions and organizations, nomination processes, campaigns and elections, party trends and reforms. GE credit: SocSci, Wrt.—Huckfeldt

162. Elections and Voting Behavior (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, upper division standing or consent of instructor. Analysis of American elections and partisan behavior; political socialization, political participation, partisanship and individual and group determinants of voting. Offered irregularly. GE credit: SocSci, Wrt.—Huckfeldt

163. Group Politics (4)
Lecture—3 hours; term paper or discussion—1 hour Prerequisite: course 1, upper division standing or consent of instructor. Groups, institutions and individuals, especially in American politics. Historical and analytical treatment of group theories as applied to interest groups (especially labor, business, agriculture, science, military); to racial, ethnic and sectional groups; to parties, public and legislative groups, bureaucracies. GE credit: SocSci, Wrt.—Huckfeldt

164. Public Opinion (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: upper division standing and course 1 or 5, or consent of instructor. Nature of public opinion in America as it is supposed to be and as it is. Distribution of opinions among different publics and the significance of that distribution for system stability and institutions. Opinion polling and its problems. GE credit: SocSci, Wrt.

165. Mass Media and Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1. Organization of and decision making within the media; media audiences and the effect of the media on attitudes and behavior; the relationship of the government to the media (censorship, secrecy, freedom of the press, government regulation); the media in election campaigns. GE credit: SocSci, Wrt.

166. Women in Politics (4)
Lecture—3 hours; discussion—1 hour or seminar—1 hour. Prerequisite: course 1. The role of women in American politics. Historical experiences; contemporary organizations and strategies; areas of legislative concern; the impact of differences in social class, race, and ethnicity upon the involvement of women in politics. GE credit: SocSci, Div.

168. Chicano Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1. Political aspects of Chicano life in America; examines the Chicanos political role as it has been historically defined by different groups in society and the Chicanos responses to his/her political environment. GE credit: Div, SocSci, Wrt.

170. Political Psychology (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 51 or consent of instructor; upper division standing. Overview to the growing literature on political psychology. Introduction to how psychological concepts (personality, attitudes, stereotypes, heuristics, affect, identity, group dynamics) help us understand how citizens think about politics. GE credit: SocSci, Wrt.

171. The Politics of Energy (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, upper division standing. Nature and performance of political processes for making energy choices at the international, national and state levels. Interaction of energy policy with other political goals and the ability of governmental institutions to overcome constraints on policy innovation. GE credit: SocSci, Wrt.

172. American Political Development (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, some background in American politics is strongly recommended. Systematic analysis of contemporary issues in American political development: historical determinants of political change; the timing and character of institutional development; conditions for successful political action. Democratization, cultural change, party formation, state-building, constitutionalism, race relations. GE credit: SocSci, Wrt.

174. Government and the Economy (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1, upper division standing in Political Science or consent of instructor. Political basis of economic policy (taxation, spending and regulation); impact of prices, employment and growth on political demands; elite responses to economic conditions; policy alternatives and the public interest. GE credit: SocSci, Wrt.—III. (III.)

175. Science, Technology, and Policy (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1; consent of instructor. Analysis of policymaking for science and the use of scientific expertise for making decisions about technology. Topics include funding of basic research, relationship of science to technological development, science and military policy, technological risks, technology assessment and scientists and politics. GE credit: SocSci, Wrt.

176. Racial Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1. Race, racial attitudes and racial policies in the United States with a specific emphasis on African Americans. GE credit: Div, SocSci, Wrt.

179. Special Studies in Comparative Politics (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 2, consent of instructor and upper division standing. Intensive examination of one or more special problems appropriate to comparative politics. Coverage is given to formal and informal political institutions, economically developing and developed countries, and non-democratic, democratic, and democratizing countries. May be repeated once for credit. GE credit: SocSci, Wrt.

180. Bureaucracy in Modern Society (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 or 2, upper division standing in Political Science or consent of instructor. Role of bureaucracy in a complex society, with emphasis upon changing relationships between government and the economy; consequences of rapid technological and social change for bureaucratic structures and processes; the problems of reconciling expertise and democracy and increasing the responsiveness of public bureaucracy. GE credit: SocSci, Wrt.

183. Administrative Behavior (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 and upper division standing or consent of instructor. The implications for American public administration of evolving concepts about behavior in organizations. Offered irregularly. GE credit: SocSci, Wrt.—Huckfeldt

187. Administrative Theory (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1 and upper division standing or consent of instructor. Historical and critical analysis of the principal theories of organization and management of public agencies in light of such concepts as decision making, bureaucracy, authority and power, communication and control; examination of role of government bureaucracies in the total society. GE credit: SocSci, Wrt.—III. (III.) Hill

190. International Relations (4)
Lecture—3 hours; term paper or discussion—1 hour. Open to majors in International Relations, or consent of instructor. Analysis and evaluation of substantive issues in contemporary international relations. Readings drawn from current academic and non-academic periodicals. GE credit: SocSci, Wrt.

192A. Internship in Public Affairs (5)
Prerequisite: enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science–Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.) GE credit: SocSci, Wrt.

192B. Internship in Public Affairs (5)
Prerequisite: course 192A; enrollment dependent on availability of intern positions with highest priority assigned to students with Political Science–Public Service major; upper division standing. Supervised internship and study in political, governmental, or related organizations. (P/NP grading only.) GE credit: SocSci, Wrt.

192W. Internship in the UC Davis **Washington Center Program (7)**
Internship—28 hours. Prerequisite: junior or senior standing, admission in the UC Davis Washington Center undergraduate program, course 193W concurrently. Internship in Washington, DC with associated, supervised research project. (Same course as UC Davis Washington Center 192.) (P/NP grading only.)—I, II, III.

193. Research in Practical Politics (2)
Research project—6 hours. Prerequisite: courses 192A, 192B; open only to Political Science–Public Service majors, for whom it is required. Supervised preparation of an extensive paper relating internship experience to concepts, literature, and theory of political science.—I, II, III.

193W. Washington Center Research Seminar (4)
Lecture/discussion—1 hour; independent study—3 hours; tutorial—0.5 hour. Prerequisite: course 192W concurrently. Core academic component of Washington Program. Topics coordinated with internships. Research draws on resources uniquely available in Washington, DC. Supervised preparation of extensive paper. (Same course as UC Davis Washington Center 193.) GE credit: Wrt.—I, II, III.

194HA-194HB. Special Study for Honors Students (4-4)
Seminar—2 hours; independent study—2 hours. Prerequisite: major in Political Science with upper division standing and a GPA of 3.500 in the major. Directed reading, research and writing culminating in preparation of a senior honors thesis under the direction of faculty adviser. (Deferred grading only, pending completion of sequence.)—I, II.

195. Special Studies in American Politics (4)
Seminar—4 hours. Prerequisite: consent of instructor and upper division standing. Intensive examination of one or more special problems appropriate to American politics. May be repeated one time for credit when topic differs.—I.

196A. Seminar in American Politics (4)
Seminar—3 hours; term paper. Prerequisite: upper division political science major or consent of instructor. Intensive reading, discussion, research, writing in American politics. Topics may include Congress, the Presidency, the Supreme Court, federalism, voting behavior, interest groups, ethnic groups or other topics with a more specialized content than normal course offerings. May be repeated one time for credit when topic differs.—I, II, III.

196B. Seminar in Comparative Politics (4)
Seminar—3 hours; term paper. Prerequisite: upper division political science major or consent of instructor. Intensive reading, discussion, research, writing in comparative politics. Topics may include one country or geographical area, political institutions or behavior across countries, political development, or other topics that are more specialized than normal course offerings. May be repeated one time for credit when topic differs.—I, II, III.

196C. Seminar in International Relations (4)
Seminar—3 hours; term paper. Prerequisite: upper division political science major or consent of instructor. Intensive reading, discussion, research, writing in international relations including study of international political institutions (UN, EU, or NATO) or interstate relations (war, trade, immigration) and other topics with more specialized content than normal course offerings. May be repeated one time for credit when topic differs.—I, II, III.

196D. Seminar in Political Theory (4)
Seminar—3 hours; term paper. Prerequisite: upper division political science major or consent of instructor. Intensive reading, discussion, research, writing in political theory. Topics may include study of a single political thinker, a group of related thinkers, development of political concepts, or other topics with more specialized content than normal course offerings. May be repeated one time for credit when topic differs.—I, II, III.

196E. Seminar in Research Methods (4)
Seminar—3 hours; term paper. Prerequisite: upper division political science major or consent of instructor. Intensive reading, discussion, research, and writing in selected topics in research methods such as research design, statistics, game theory. May be repeated one time for credit when topic differs.—I, II, III.

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

201. Urban Government and Politics (4)
Seminar—4 hours. Survey and analysis of the literature in the field of local government and politics in the United States. Approaches to the study of political reform, local autonomy, community power, representation, expertise, service delivery, policymaking and political change. Offered in alternate years.

202. American State Government and Politics (4)
Seminar—4 hours. Survey and analysis of the literature in the field of state government, politics, and policy. Approaches to the study of the American states as political systems, including their governing institutions and processes and their role in the Federal system. Offered in alternate years.

203A. American Government: The Presidency (4)
Seminar—4 hours. Thorough overview of the current research on political executives, with particular emphasis on the American presidency. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations.—II. (II.)

203B. American Government: Congress (4)
Seminar—4 hours. Thorough overview of the current research on Congress, with particular emphasis on political representation. Two principal goals: the development of important and innovative student research programs; and adequate preparation for qualifying examinations.—III.

203C. American Government: Courts (4)
Seminar—4 hours. Survey and analysis of the literature in the field of American government with a focus on courts. Emphasis on the development and testing of theories of behavior and processes.

207. Environmental Public Policy (4)
Seminar—4 hours. Analysis of the interface between the world of academic reflection about ecological and environmental problems and the world of political action. Evaluation of alternative approaches to policy analysis and recommendation. Individual research, including field research, will parallel discussion of the literature.

208. Policy Analysis (4)
Seminar—4 hours. Social science techniques applied to public policy formation and evaluation.—II. (II.)

209. The American Political System (4)
Seminar—4 hours. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics.—II.

210. Research Design in Political Science (4)
Seminar—3 hours; discussion/laboratory—1 hour. Prerequisite: graduate standing. Introduction to philosophy of science and research design for political science. Topics include: logic of empirical research, overview of research design approaches for political science research.—I.

211. Research Methods in Political Science (4)
Seminar—3 hours; discussion/laboratory—1 hour. Prerequisite: graduate standing. Introductory seminar introducing data analysis methods critical to basic empirical investigations in political science.—I.

212. Quantitative Analysis in Political Science (4)
Seminar—4 hours. Prerequisite: course 211. Topics usually covered in an introductory statistics course with an emphasis on applications in political science—descriptive statistics for samples, probability and probability distributions, hypothesis testing, ANOVA, bivariate regression, and introduction to multiple regression.—II.

213. Quantitative Analysis in Political Science II (4)
Seminar—4 hours. Prerequisite: courses 211, 212. More advanced topics in the use of statistical methods, with emphasis on political applications. Topics include: properties of least squares estimates, problems in multiple regression, and advanced topics (probit analysis, simultaneous models, time-series analysis, etc.).—III.

214A. Research in Political Science (4)
Discussion—2 hours; lecture—1 hour; term paper. Prerequisite: course 213. Research seminar sequence required of all Ph.D. students. Design, execution, and defense of an original piece of research in political science, culminating in a paper of publishable quality. (Deferred grading only, pending completion of sequence.)—II. (II.)

214B. Research in Political Science (4)
Discussion—2 hours; lecture—1 hour; term paper. Prerequisite: courses 212 and 214A; advanced level graduate students in the Department of Political Science only. Research seminar sequence required of all Ph.D. students. Design, execution, and defense of an original piece of research in political science, culminating in a paper of publishable quality. (Deferred grading only, pending completion of sequence.)—II. (II.) Highton

215. Introduction to Modeling Political Behavior (4)
Seminar—3 hours. Prerequisite: courses 211 and 212. Introduction to formal and game theoretic analyses of politics. Students will learn basic game theory and modeling skills. We examine the benefits of modeling, and look at examples of formal analysis in a variety of political science sub-fields. Offered in alternate years.—I.

216. Qualitative Research Methods (4)
Seminar—3 hours; term paper. Methodology for utilizing theoretically-oriented case studies and controlled comparison of a small number of cases to develop and test theories. Examination of how the case study method compliments experimental, statistical and deductive modes of research. Offered in alternate years.—III.

217. Social Choice Theory and Spatial Modeling (4)
Seminar—4 hours. Introduction to social choice theory and formal spatial modeling including Arrow's Theorem, the paradox of voting, cycling and agenda control. Focus on mastering modeling techniques as well as interpretation of classic works. Offered in alternate years.

218. Topics in Political Theory (4)
Seminar—3 hours; term paper. Topics will vary and may be the work of a single theorist, time period, or political concept, such as justice. Offered in alternate years.—II.

219A. Political Theory Sequence (4)
Seminar—3 hours; term paper. Survey of the great works in ancient and medieval political theory including such writers as Plato, Aristotle, Cicero, St. Augustine, Aquinas, Alfarabi and Marsilius. Discussion of various interpretations of these authors. Offered in alternate years.—II.

219B. Political Theory Sequence (4)
Seminar—3 hours; term paper. Survey of the great works in early modern to contemporary political theory including such writers as Machiavelli, Hobbes, Locke, Rousseau, Marx, Mill, Nietzsche, and Rawls. Discussion of various interpretations of these authors. Offered in alternate years.—I. (III.)

219C. Contemporary Political Theory (4)
Seminar—3 hours; term paper. Survey of important works in contemporary political theory including such writers as Nietzsche, Heidegger, Arendt, Rawls, Nozick, Sandel. May be repeated for credit if topic differs.—III. (III.)

220. Seminar in Political Theory (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Introduction to political theory and current debates over its study. Readings from and textual interpretations of political theory including the Federalist Papers and major works by thinkers such as Plato, Aristotle, Machiavelli, Hobbes, Locke, Rousseau, and Rawls. Other readings addressing issues of textual interpretation.—I.

223. International Relations (4)
Seminar—3 hours; term paper.—I.

225. The International System (4)
Seminar—3 hours; term paper. Analysis of the international system by means of theory formulation and integration; critique of research designs; use of various techniques of data generation and analysis.—III.

226. Seminar in International Political Economy (4)
Seminar—4 hours. Research in international political economy. Structure of the global economy, as well as specific dimensions of international economic relations, including trade, capital flows, global production structures, and migration. Offered in alternate years.—I.

229. Theories of International Relations (4)
Seminar—3 hours; term paper. Central concepts, debates, and paradigms in international relations; overview of research in international security and international political economy; inter-state and intra-state war; cooperation and conflict resolution; trade and finance; relationship between domestic and international politics, norms and institutions. Open to political science graduate students only unless consent of instructor. Offered in alternate years.—III. Goldman

230. American Foreign Policy (4)
Seminar—3 hours; term paper.—III.

231. U.S. Political Culture and Foreign Relations (4)
Seminar—3 hours; term paper. Relates U.S. political culture to formulation of foreign policy. Analyzes American ideological preferences in historical perspective, contemporary public opinion, decision making and implementation. Concludes by examining linkages between foreign policy behavior and democratic process. Offered in alternate years.—II.

241. Communist Political Systems (4)
Seminar—4 hours. Prerequisite: course 141 or the equivalent, or consent of instructor. Systematic analysis of selected topics dealing with the political process of communist political systems.

242. Seminar in Comparative Politics (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Systematic survey of theories and methods used in the study of comparative politics.

243. Comparative Institutional Change (4)
Seminar—4 hours. Comparison of institutional changes in countries of the former Soviet Union and Eastern Europe during the period of transition to democracy. Special attention to institutions of mass representation—electoral and party systems and national legislatures. Offered in alternate years.

246. Policymaking in Third-World Societies (4)
Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Included in an analysis of policymaking process in Third-World countries are such topics as political resources, institutional resources, decision making, resource allocations, planning, and budgeting, implementation, and distribution of world resources. Offered in alternate years.

250. Policy Development and Impact in U.S. Courts (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Thorough overview of the literature regarding courts as policymaking institutions of government, with emphasis on the formation and implementation of judicial policy. Differences and similarities across the judicial, congressional, and executive branch policy processes. Offered in alternate years.

260. Political Parties (4)
Seminar—3 hours; term paper. Survey of selected topics in American and comparative parties.

261. Political Behavior (4)
Seminar—3 hours; term paper. Survey of selected topics in political behavior and public opinion.—III.

274. Political Economy (4)
Seminar—4 hours. Politics of economic policy as reflected in taxation, spending and regulation; impact of prices, employment, and growth on political demands; government responses to economic conditions; electoral politics and the political business cycle. Offered in alternate years.—III.

279. Political Networks: Methods and Applications (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Structure of political networks, sociomatrices and affiliation networks; general networks characteristics: density, centralization, polarization, interdependence, dyadic and triadic characteristics: structural and role equivalence; subsets of networks: cliques, blocks and bloc modeling; characteristics of individuals in networks: centrality and prestige.—II. (II.) Maoz

280. Bayesian Methods: for Social and Behavioral Sciences (4)
Seminar—3 hours; lab—1 hour. Prerequisite: course 212 or equivalent; graduate standing. Methodology seminar introducing Bayesian quantitative methods to issues and problems in political science and other social and behavioral sciences. Offered in alternate years.—(I.)

281. Statistical Computing Issues in Political Science (4)
Seminar—3 hours; discussion/laboratory—1 hour. Prerequisite: course 213 or equivalent; graduate standing. Methodology seminar introducing computing issues in empirical models for political science and other social and behavioral sciences. Offered in alternate years.—(I.)

282. Advanced Modeling of Political Behavior (4)
Seminar—3 hours; term paper. Prerequisite: course 215 or equivalent; graduate standing or consent of instructor. Applications of formal theory to political science. Review of relevant contributions in other social sciences. Consideration of advanced techniques in game theory. Rational and behavioral approaches.—III. (III.)

283. Organizational Behavior (4)
Seminar—4 hours. Organizational behavior as it relates to public sector decision making.

290A. Research in American Government and Public Policy (4)
Seminar—4 hours. Special research seminar on selected problems and issues in the study of American government and public policy. May be repeated up to 6 times for credit if taught by different instructor.—I, II, III

290B. Research in Political Theory (4)
Lecture—3 hours; term paper. Restricted to graduate students only. Special research seminar on problems and issues in the study of political theory. May be repeated six times for credit if topic varies.—I, II, III. (I, II, III.)

290C. Research in International Relations (4)
Lecture—3 hours; term paper. Restricted to graduate students only. Special research seminar on select problems and issues in the study of international relations. May be repeated six times for credit if topic varies.—I, II, III. (I, II, III.)

290D. Research in Judicial Politics (4)
Seminar—4 hours. Prerequisite: graduate standing in political science or consent of instructor. Contemporary research on judicial politics, judicial institutions, jurisprudence, and judicial behavior.—I, II, III.

290E. Research in Political Parties, Politics, and Political Behavior (4)
Seminar—4 hours. Special research seminar on selected problems and issues in the study of political parties, politics, and political behavior.—I, II, III.

290F. Research in Comparative Government and Policy (4)
Lecture—3 hours; term paper. Restricted to graduate students only. Special research seminar on select problems and issues in the study of comparative government and policy. May be repeated six times for credit if topic varies.—I, II, III. (I, II, III.)

290G. Research in Methodology (4)
Lecture—3 hours; term paper. Prerequisite: course 212. Special research seminar on selected problems and issues in methods in political science. May be repeated three times for credit if topic varies.—I, II, III. (I, II, III.)

297. Internships in Political Science (2)
Seminar—2 hours. Prerequisite: open only to persons who have internships or other positions in governmental agencies, political parties, etc. Application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit. (S/U grading only.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

299D. Directed Reading (1-12)
(S/U grading only.)

Professional Courses

390. The Teaching of Political Science (1)
Seminar—1 hour. Prerequisite: graduate student standing in Political Science. Methods and problems of teaching political science at the undergraduate level. (S/U grading only.)—I, II, III.

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III.

Pomology

See Plant Sciences, on page 461.

Population Biology (A Graduate Group)

David J. Begun, Ph.D., Chairperson of the Group

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http://www.eve.ucdavis.edu/eve/pbg/

Faculty

Marissa L. Baskett, Ph.D., Assistant Professor *(Environmental Science and Policy)*
David J. Begun, Ph.D., Professor *(Evolution and Ecology)*
Monique Borgerhoff Mulder, Ph.D., Professor *(Anthropology)*
Louis W. Botsford, Ph.D., Professor *(Wildlife, Fish, and Conservation Biology)*
Tim Caro, Ph.D., Professor *(Wildlife, Fish, and Conservation Biology)*
Graham M. Coop, Ph.D., Assistant Professor *(Evolution and Ecology)*
Howard V. Cornell, Ph.D., Professor *(Environmental Science and Policy)*
Jonathan A. Eisen, Ph.D., Professor *(Evolution and Ecology)*
Valerie Eviner, Ph.D., Assistant Professor *(Plant Sciences)*
James R. Griesemer, Ph.D., Professor *(Philosophy)*
Richard K. Grosberg, Ph.D., Professor *(Evolution and Ecology) Academic Senate Distinguished Teaching Award*
Susan P. Harrison, Ph.D., Professor *(Evolution and Ecology)*
Alan M. Hastings, Ph.D., Professor *(Evolution and Ecology)*
Richard Karban, Ph.D., Professor *(Entomology)*
Artyom Kopp, Ph.D., Assistant Professor *(Evolution and Ecology)*
Charles H. Langley, Ph.D., Professor *(Evolution and Ecology)*
Sharon P. Lawler, Ph.D., Associate Professor *(Entomology)*
Richard McElreath, Ph.D., Associate Professor *(Anthropology)*
Brian R. Moore, Ph.D., Assistant Professor *Evolution and Ecology)*
David B. Neale, Ph.D., Professor *(Plant Sciences)*
Gail L. Patricelli, Ph.D., Associate Professor *(Evolution and Ecology)*
Bruce H. Rannala, Ph.D., Professor *(Evolution and Ecology)*
Kevin J. Rice, Ph.D., Professor *(Plant Sciences)*
Jay A. Rosenheim, Ph.D., Professor *(Entomology)*
Eric D. Sanford, Ph.D., Associate Professor *(Evolution and Ecology)*
Thomas W. Schoener, Ph.D., Professor *(Evolution and Ecology)*
Sebastian Schreiber, Ph.D., Professor *(Evolution and Ecology)*
Mark W. Schwartz, Ph.D., Professor *(Environmental Science and Policy) Academic Senate Distinguished Teaching Award*
H. Bradley Shaffer, Ph.D., Professor *(Evolution and Ecology)*
Arthur M. Shapiro, Ph.D., Professor *(Evolution and Ecology) Academic Senate Distinguished Teaching Award*
Andrew Sih, Ph.D., Professor *(Environmental Science and Policy)*
John J. Stachowicz, Ph.D., Professor *(Evolution and Ecology)*
Maureen L. Stanton, Ph.D., Professor *(Evolution and Ecology) UC Davis Prize for Teaching and Scholarly Achievement*
Sharon Y. Strauss, Ph.D., Professor *(Evolution and Ecology)*
Donald R. Strong, Ph.D., Professor *(Evolution and Ecology)*
Catherine A. Toft, Ph.D., Professor *(Evolution and Ecology)*
Michael Turelli, Ph.D., Professor *(Evolution and Ecology)*
Geerat J. Vermeij, Ph.D., Professor *(Geology)*
Peter C. Wainwright, Ph.D., Professor *(Evolution and Ecology) Academic Senate Distinguished Teaching Award*
Philip S. Ward, Ph.D., Professor *(Entomology)*
Louie H. Yang, Ph.D., Assistant Professor *(Entomology)*
Truman P. Young, Ph.D., Professor *(Plant Sciences)*

Emeriti Faculty

Hugh Dingle, Ph.D., Professor Emeritus
John H. Gillespie, Ph.D., Professor Emeritus
Leslie D. Gottlieb, Ph.D., Professor Emeritus
Timothy G. Prout, Ph.D., Professor Emeritus
Judy A. Stamps, Ph.D. Professor Emeritus

Graduate Study. The Graduate Group in Population Biology emphasizes programs of study and research leading to the Ph.D. degree. The Group concentrates on population biology as the broad discipline that blends ecology, evolution, population genetics and systematics into a unified field. The course curriculum consists of first-year core courses offered by the Group faculty, seminars, and advanced courses in population biology, and related disciplines, chosen in consultation with a guiding committee.

Graduate Adviser. Consult the Population Biology Graduate Group office or website.

Courses in Population Biology (PBG)

Graduate Courses

200A. Principles of Population Biology (5)
Lecture—3 hours; discussion—2 hours. Prerequisite: course 231 concurrently and consent of instructor. Principles of single-species ecology and evolution. Topics include ecology of individuals, population growth models, structured populations, life history strategies, stochastic populations, basic population genetics theory, deleterious alleles in natural populations, and molecular population genetics.—I. (I.)

200B. Principles of Population Biology (6)
Lecture—5 hours; discussion—1 hour. Prerequisite: course 200A, 231. Principles of multi-species communities. Topics include competition, mutualism, metapopulations, food webs and trophic cascades, interactions between simple ecological communities, island biogeography, succession, and large-scale patterns.—II. (II.)

200C. Principles of Population Biology (6)
Lecture—5 hours; discussion—1 hour. Prerequisite: course 200B. Principles of microevolution and macroevolution. Topics include evolutionary quantitative genetics, analysis of hybrid zones, speciation, the fossil record, biogeography, and phylogeny reconstruction.—III. (III.)

203. Advanced Evolution (3)
Lecture—1 hour; discussion—2 hours. Prerequisite: graduate standing. Adaptation and speciation, and biochemical and morphological evolution in plants and animals with emphasis on the appropriateness of different methods of analysis. Offered in alternate years.

206. Ecology of Insect Parasitoids (4)
Lecture—3 hours; seminar—1 hour. Prerequisite: introductory animal ecology or behavior. Insect parasitoids will be investigated as model systems to address current topics in behavioral, population, and evolutionary ecology. Theory will be synthesized and critical empirical tests of ecological hypotheses emphasized. (Same course as Entomology 206.) Offered in alternate years.

207. Plant Population Biology (3)
Lecture—2 hours; laboratory/discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Science and Policy 100, Evolution and Ecology 101, Entomology 104, Plant Biology 117), and advanced undergraduate course in genetics and/or evolution (e.g., Biological Sciences 101 or Evolution and Ecology 100). Introduction to theoretical and empirical research in plant population biology. Emphasis placed on linking ecological and genetic approaches to plant population biology. (Same course as Ecology 207.) Offered in alternate years.—II. Rice

212. Topics in Invertebrate Evolution (2)
Seminar—2 hours. Prerequisite: graduate standing or consent of instructor and Evolution and Ecology 112-112L; courses in evolutionary biology, systematics, and ecology highly recommended. Advanced seminar that critically examines problems relevant to evolutionary patterns among the invertebrates. May be repeated for credit when topic differs. (S/U grading only.)—(III.) Grosberg

220. Spatio-Temporal Ecology (2)
Lecture/discussion—2 hours. Prerequisite: course 200B or Ecology 204 or Evolution and Ecology 104 or Environmental Science and Policy 121 or consent of instructor. Spatiotemporal ecological theory focusing on population persistence and stability, predator-prey and host-parasitoid interactions, species coexistence and diversity maintenance, including effects of environmental variation, spatial and temporal scale, life-history traits and nonlinear dynamics. Topics vary. (Same course as Ecology 220.) May be repeated one time for credit. (S/U grading only.)

221. Animal Behavior, Ecology and Evolution (3)
Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 102, Evolution and Ecology 100, 101 or the equivalent, graduate standing, and consent of instructor. The interface between animal behavior, ecology and evolution. New developments in behavioral ecology and development and testing of hypotheses in this discipline. (Same course as Animal Behavior 221.)

224. Field Reconnaissance for Population Biologists (2)
Fieldwork—6 hours. Prerequisite: graduate student in Population Biology, or consent of instructor. Biweekly field trips to acquaint students with plant and animal communities, biodiversity, and ecological and evolutionary research opportunities in northern and central California. May be repeated for credit. (S/U grading only.)

225. Terrestrial Field Ecology (4)
Seminar—1 hour; field work—12 hours. Prerequisite: introductory ecology and introductory statistics, or consent of instructor. A field course conducted over spring break and four weekends at Bodega Bay emphasizing student projects. Ecological hypothesis testing, data gathering, analysis, and written and oral presentation of results will be stressed. (Same course as Ecology/Entomology 225.)—III. (III.) Karban

231. Mathematical Methods in Population Biology (3)
Lecture—3 hours. Prerequisite: Mathematics 16C or 21C or the equivalent. Mathematical methods used in population biology. Linear and nonlinear difference equation and differential equation models are studied, using stability analysis and qualitative methods. Partial differential equation models are introduced. Applications to population biology models are stressed. (Same course as Ecology 231.)—I. (I.) Hastings

250A. Interdisciplinary Approaches to Biological Invasions (4)
Lecture/discussion—4 hours. Prerequisite: graduate standing. An integrative consideration of biological invasions, including an overview of concepts from ecology, ecological theory, evolution, genetics, philosophy, and other areas. Emphasis on potential contributions of each area for interdisciplinary problem solving.—I. (I.)

250B. Interdisciplinary Approaches to Biological Invasions (4)
Lecture/discussion—4 hours. Prerequisite: graduate standing. An integrative consideration of biological invasions, including an overview of concepts from history, sociology, communications, law, policy, management, and other areas. Emphasis on potential contributions of each area for interdisciplinary problem solving.—II. (II.)

251. Collaborative Project in Biological Invasions (3)
Project; discussion—1 hour. Prerequisite: course 250A, 250B, or equivalent; and consent of instructor. A year-long interdisciplinary collaborative project focusing on biological invasions, resulting in a paper or other suitable product presented at a symposium at the conclusion of the project. May be repeated up to five times. (S/U grading only.)—I, II, III. (I, II, III.)

270. Research Conference in Evolutionary Biology (1)
Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and evaluation of current literature and ongoing research in evolutionary biology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

287. Advanced Animal Behavior (2)
Seminar—2 hours. Prerequisite: graduate standing and consent of instructor, courses in animal behavior (Neurobiology, Physiology, and Behavior 102 or the equivalent), and either evolution (Evolution and Ecology 100 or the equivalent) or ecology (Evolution and Ecology 101 or the equivalent). Reading, reports and discussion on current topics in animal behavior, with a focus on topics that lie at the interface between animal behavior, ecology and evolution. (Same course as Animal Behavior 287.) May be repeated two times for credit.

290. Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by visiting lecturers, UC Davis graduate students and faculty. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Research Conference in Population Biology (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor; concurrent enrollment in course 299. Presentation and discussion of faculty and graduate student research in population biology. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

292. Topics in Ecology and Evolution (1)
Seminar—1 hour. Prerequisite: graduate standing. Seminar presented by visiting lecturers, UC Davis faculty and graduate students. May be repeated for credit. (Same course as Ecology 296.) (S/U grading only.)—I, II, III. (I, II, III.)

296. Seminar in Geographical Ecology (2)
Seminar—2 hours. Prerequisite: Evolution and Ecology 100 or 101 or consent of instructor. Recent developments in theoretical and experimental biogeography, historical biogeography and related themes in systematics, the biology of colonizing species, and related topics. May be repeated for credit. (S/U grading only.)—III. (III.) Shapiro

298. Group Study (1-5)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

299. Research (1-12)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Population Health and Reproduction

See Veterinary Medicine, School of, on page 517.

Precision Agriculture

(College of Agricultural and Environmental Sciences)

The Department of Biological and Agricultural Engineering offers a minor in Precision Agriculture, the latest farming concept that optimizes fertilizer, pesticide and water use, while minimizing environmental concerns.

Minor Program Requirements:

This minor acquaints students with recent developments and their applications to agriculture, in geographic information systems (GIS), global positioning systems (GPS), variable rate technologies (VRT), crop and soil sensors, and remote sensing. The minor prepares students for challenging positions in site-specific crop management as we enter the "information age" in agriculture.

	UNITS
Precision Agriculture	**20**
Applied Biological Systems Technology 145, 175, 180	10
Select 10 or more units from Plant Sciences 120 or Statistics 100, Plant Sciences 110A or Plant Biology 112, Environmental and Resource Sciences 186, Soil Science 109	10

Minor Advisers. S.K. Upadhyaya, D.K. Giles

Preventive Veterinary Medicine

See Veterinary Medicine, School of, on page 517.

Psychiatry

See Medicine, School of, on page 380.

Psychology

(College of Letters and Science)

Debra Long, Ph.D., Chairperson of the Department

Department Office. 135 Young Hall
(530) 752-1880; *http://psychology.ucdavis.edu*

Faculty

Karen L. Bales, Ph.D., Associate Professor
Shelley Blozis, Ph.D., Associate Professor
John P. Capitanio, Ph.D., Professor
Cameron S. Carter, M.D., Professor
(Psychiatry and Behavioral Sciences)
Rand Conger, Ph.D., Professor
David Corina, Ph.D., Professor
Richard G. Coss, Ph.D., Professor
Robert A. Emmons, Ph.D., Professor
Arne Ekstrom, Ph.D., Assistant Professor
Emilio Ferrer, Ph.D., Associate Professor
Joy Geng, Ph.D., Assistant Professor
Simona Ghetti, Ph.D., Associate Professor
Gail S. Goodman, Ph.D., Professor
Katharine Graf Estes, Ph.D., Assistant Professor
Kevin Grimm, Ph.D., Assistant Professor
Paul Hastings, Ph.D., Associate Professor
Gregory M. Herek, Ph.D., Professor
Petr Janata, Ph.D. Associate Professor
Joel T. Johnson, Ph.D., Professor
Leah A. Krubitzer, Ph.D., Professor
Kristin Lagattuta, Ph.D., Associate Professor
Alison Ledgerwood, Ph.D., Assistant Professor
Debra L. Long, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Steven Luck, Ph.D., Professor
George R. Mangun, Ph.D., Professor
Lisa Oakes, Ph.D., Professor
Donald H. Owings, Ph.D., Professor
Cynthia Pickett, Ph.D. Associate Professor
Robert B. Post, Ph.D., Professor
Charan Ranganath, Ph.D., Associate Professor
Susan Rivera, Ph.D., Associate Professor
Richard W. Robins, Ph.D., Professor
Jeffrey Schank, Ph.D., Professor
Phillip R. Shaver, Ph.D., Professor
Jeffrey W. Sherman, Ph.D. Professor
Dean K. Simonton, Ph.D., Professor
UC Davis Prize for Teaching and Scholarly Achievement

Stanley Sue, Ph.D., Professor
UC Davis Prize for Teaching and Scholarly Achievement
Tamara Swaab, Ph.D., Associate Professor
Ross Thompson, Ph.D., Professor
Brian Trainor, Ph.D., Assistant Professor
Matthew Traxler, Ph.D., Professor
Keith F. Widaman, Ph.D., Professor
Andrew P. Yonelinas, Ph.D., Professor
Nolan Zane, Ph.D., Professor

Emeriti Faculty

Linda P. Acredolo, Professor Emerita
Jarvis R. Bastian, Ph.D., Professor Emeritus
Alan C. Elms, Ph.D., Professor Emeritus
Karen P. Ericksen, Ph.D., Professor Emerita
Albert A. Harrison, Ph.D., Professor Emeritus
Kenneth R. Henry, Ph.D., Professor Emeritus
Neal E. A. Kroll, Ph.D., Professor Emeritus
Peter R. Marler, Ph.D., Professor Emeritus
William A. Mason, Ph.D., Professor Emeritus
Sally Mendoza, Ph.D., Professor Emerita
G. Mitchell, Ph.D., Professor Emeritus
Robert M. Murphey, Ph.D., Professor Emeritus
Thomas Natsoulas, Ph.D., Professor Emeritus
Theodore E. Parks, Ph.D., Professor Emeritus
Robert Sommer, Ph.D., Professor Emeritus
Charles T. Tart, Ph.D., Professor Emeritus

Affiliated Faculty

Katherine Gibbs, Ph.D., Lecturer
Jacqueline Horn, Ph.D., Lecturer
Elizabeth Post, Ph.D., Lecturer
Joanna Scheib, Ph.D., Adjunct Assistant Professor
Eva Schepeler, Ph.D. Lecturer

The Major Programs

The psychology program at UC Davis is broad and includes students and faculty with a variety of interests. The department has developed around five major areas of emphasis: Developmental Psychology, which involves the study of changes in behavior and abilities that occur as development proceeds and includes such topics as imaging the developing brain, development of self esteem, problem solving, attachment theory, symbolic representation in infants and children, development of children's understanding of mental states; Perception-Cognition, which involves the study of awareness and thought, and includes such topics as perception, learning, memory, and consciousness; Psychobiology, which involves the study of the biological correlates of behavior and includes such topics as physiological psychology, sensory processes, health psychology, and animal behavior; Social-Personality Psychology, which involves the study of the individual in his or her social environment and includes such topics as personality theory, abnormal psychology, individual differences, developmental psychology, and social psychology; and Quantitative which involves the study of linear models and psychometrics which includes topics, such as experimental design and the analysis of variance, regression analysis, and multivariate analysis.

The department offers the Bachelor of Arts (A.B.) program for students interested in the liberal arts and the Bachelor of Science (B.S.) program geared for students with an interest in either biology or mathematics. The main objective of both programs is a broad introduction to the scope of contemporary psychology. In addition to completing a number of common core courses for their degree, students may take specialty courses on such far-ranging topics as sex differences, genius and creativity, and environmental awareness. The department strongly encourages students to become involved in individual research projects under the direction of faculty members and to participate in our internship program to broaden your experiences and understanding of the field of psychology.

Preparatory Requirements. Before declaring a major in psychology, students must complete the following courses with a combined grade point average of at least 2.500. All courses must be taken for a letter grade. (Students in the Bachelor of Science, Biology program must complete Biological Sciences 2A.):

Psychology 1, 41 ..... 8 units
Statistics 13 or 102 ..... 4 units
Biological Sciences 2A
or
Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, Neurobiology, Physiology, and Behavior 10 ..... 4 or 8 units
Sociology or cultural anthropology .... 4 units

Career Alternatives. A degree in psychology provides broad intellectual foundations which are useful to the graduate for the development of careers in a variety of areas, including social work, the ministry, teaching, business, and counseling. An undergraduate education in psychology also provides excellent preparation for graduate study. Individuals with degrees in psychology may enter graduate programs to prepare for teaching, research, or clinical/counseling careers in psychology, or may go on to professional schools for training in veterinary and human medicine, law, and other professions.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 20-25

Psychology 1 or the equivalent 4
Psychology 41 4
Statistics 13 or 102 4
Strongly recommended that Psychology 41 and Statistics 13 or 102 be completed in the first year.
Biological Sciences 2A; or a combination of Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, or Neurobiology, Physiology, and Behavior 10 4-8
One course in sociology or cultural anthropology; may be lower or upper division, minimum of 4 units 4-5

Depth Subject Matter 40

Two courses from two of the following four groups and one course from the remaining two groups 23-24
Group A: Psychology 100, 130, 131, 132, 135, 136
Group B: Psychology 101, 113, 121, 122, 123, 126, 127, 129
Group C: Psychology 151, 152, 154, 161, 162, 168
Group D: Psychology 140; or Human Development 100A or 100B, Psychology 141/Human Development 101, Psychology 142/Human Development 102, 143, 146, 148
Additional units to achieve a total of 40 upper division units in psychology 16-17
A maximum of 12 approved upper division Human Development units can be credited toward satisfaction of the 40-unit requirement.

Total Units for the Major 60-65

Biology Emphasis

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 51-59

Psychology 1 or the equivalent 4
Psychology 41 4
Statistics 13 or 102 4
Strongly recommended that Psychology 41 and Statistics 13 or 102 be completed in the first year.
Mathematics 16A-16B or 17A-17B or 21A-21B 6-8
Physics 10 or 7A-7B 4-8
Biological Sciences 2A, 2B 9
Chemistry 2A, 2B 10
Chemistry 8A-8B or 118A-118B or 128A-128B 6-8
One course in sociology or cultural anthropology; may be lower or upper division, minimum of 4 units 4-5

Depth Subject Matter 49

Seven Psychology courses distributed as specified:
Group A: two courses from Psychology 100, 130, 131, 132, 135, 136 8
Group B: three courses from Psychology 101, 113, 121, 122, 123, 126, 127, 129 11-12
Group C: one course from Psychology 151, 152, 154, 161, 162, 168 4
Group D: one course from Psychology 140 (or Human Development 100A or 100B), Psychology 141/Human Development 101, Psychology 142/Human Development 102, 143, 146, 148 4
Additional units to achieve a total of 40 upper division units in psychology 12-13
(A maximum of 12 approved upper division Human Development units can be credited toward satisfaction of the 40-unit requirement.)
Biological Sciences 101 4
Neurobiology, Physiology, and Behavior 101 5

Total Units for the Major 100-108

Recommended

Psychology 180B, 199; on a psychobiological topic, Anthropology 154A, Environmental Science and Policy 110, Evolution and Ecology 100, 101.

Mathematics Emphasis

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 44-59

Psychology 1 or the equivalent 4
Psychology 41 4
Statistics 13 or 102 4
Strongly recommended that Psychology 41 and Statistics 13 or 102 be completed in the first year.
Mathematics 21A, 21B, 21C 12
Computer Science Engineering 30 or Computer Science Engineering 10 4
Chemistry 10 or 2A-2B or 2AH-2BH 4-10
Physics 10 or 7A-7B 4-8
Biological Sciences 2A; or a combination of Biological Sciences 10 and one course from Anthropology 1, Molecular and Cellular Biology 10, or Neurobiology, Physiology, and Behavior 10 4-8
One course in sociology or cultural anthropology; may be lower or upper division, minimum of 4 units 4-5

Depth Subject Matter 49

Five Psychology courses, distributed as specified:
Group A: two courses from 100, 130, 131, 132, 135, 136 8
Group B: two courses from Psychology 101, 113, 121, 122, 123, 126, 127, 129 7-8
Group C: one course from Psychology 151, 152, 154, 161, 162, 168
or
Group D: one course from Psychology 140 (or Human Development 100A or 100B), Psychology 141/Human Development 101, Psychology 142/Human Development 102, 143, 146, 148 4
Additional units to achieve a total of 40 upper division units in psychology 11-12
A maximum of 12 approved upper division Human Development units can be credited toward satisfaction of the 40-unit requirement.
Psychology 103A 5
One course from Psychology 103B, 104, or the equivalent 4

One course sequence from Statistics 106–108, 130A-130B, 131A-131B 8

Total Units for the Major 93-108

Recommended for All Majors. Students who plan to do graduate work in any area of psychology are strongly encouraged to complete Statistics 13 and Psychology 103A or both Statistics 13 and 102. Psychology 41 is a prerequisite for most upper division courses. Psychology 41 and Statistics 13 or 102 should be completed in the first year.

Major Advisers. K. Bales, S. Blozis, R.G. Coss, R.A. Emmons, A. Ekstrom, E. Ferrer, J. Geng, S. Ghetti, G.S. Goodman, K. Graf Estes, K. Grimm, P. Hastings, G.M. Herek, P. Janata, J.T. Johnson, L.A. Krubitzer, K. Lagattuta, A. Ledgerwood, D.L. Long, S. Luck, G.R. Mangun, L. Oakes, D.H. Owings, C. Pickett, R.B. Post, C. Ranganath, S. Rivera, R.W. Robins, P.R. Shaver, J. Sherman, D.K. Simonton, S. Sue, T. Swaab, R. Thompson, B Trainor, M. Traxler, K.F. Widaman, A.P. Yonelinas, N.W. Zane

Human Development course credit. Human Development 100A, 100B, 100C, 101, 102, 120, and 121 can be used toward satisfying the 40-unit upper division major requirement to a maximum of 12 units. Students who have completed Human Development 100A or 100B will receive 2 units of credit for Psychology 140.

Minor Program Requirements:

UNITS

Psychology 24

Psychology 1 or the equivalent 4
One course from each of the following four groups..... 15-16
Group A: Psychology 100, 130, 131, 132, 135, 136
Group B: Psychology 101, 113, 121, 122, 123, 126, 127, 129
Group C: Psychology 151, 152, 154, 161, 162, 168
Group D: Psychology 140, 141, 142, 143, 146, 148
Additional units to achieve a total of 20 upper division units..... 4-5
One course selected from Human Development 100A, 100B, 100C, 101, 102, 120, 121 can be used toward satisfying the minor upper division unit requirement.

Honors and Honors Program. In order to be eligible for high or highest honors in Psychology, the student must both meet the college criteria and complete a research project involving a minimum of six units of course work over at least two quarters which represents an original analysis of data on psychological phenomena. Course 194HA-194HB or other approved courses can be used to satisfy the unit requirement. This project is to be written in thesis form and approved by the department. The quality of the thesis work will be the primary determinant for designating high or highest honors at graduation.

Graduate Study. The Department offers programs of study and research leading to the Ph.D. degree in psychology. Detailed information regarding graduate study may be obtained by writing the Graduate Adviser, Department of Psychology.

Graduate Adviser. See *Class Schedule and Registration Guide*.

Courses in Psychology (PSC)

Lower Division Courses

1. General Psychology (4)

Lecture—4 hours. Introduction emphasizing empirical approaches. Focus on perception, cognition, personality and social psychology, and biological aspects of behavior. Only two units allowed to those who have taken course 15 or 16; no credit allowed to those who have taken both courses 15 and 16. GE credit: SocSci.—I, II, III. (I, II, III.) Shaver, Johnson, E. Post, Thompson, Tavano-Hall, Traxler

20. Freshman Psychology Seminar (4)

Seminar—4 hours. Prerequisite: freshman standing. Instructor will acquaint students with his or her program of research, the development of scientific questions from the literature, and the application of research methods to examine these questions. Critical thinking will be encouraged via expository writing and brief presentations.

41. Research Methods in Psychology (4)

Lecture—3 hours; autotutorial. Prerequisite: course 1 or the equivalent; Statistics 13 or 102 recommended. Introduction to experimental design, interviews, questionnaires, field and observational methods, reliability, and statistical inference.—I, II, III. (I, II, III.)

41S. Research Methods in Psychology (4)

Lecture/laboratory—10 hours; web virtual lecture—10 hours. Prerequisite: course 1 or equivalent. Introduction to experimental design, interviews, questionnaires, observational research, qualitative approaches, case studies, content analysis, sampling, descriptive statistics, and statistical inference. Limited enrollment. Not open for credit to students who have taken course 41.—IV.

90X. Lower Division Seminar (1-2)

Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Psychology through shared readings, discussions, written assignments, or special activities such as fieldwork or laboratory work. May not be repeated for credit. Limited enrollment.

98. Directed Group Study (1-5)

Primarily for lower division students. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5)

(P/NP grading only.)

Upper Division Courses

100. Introduction to Cognitive Psychology (4)

Lecture—4 hours. Prerequisite: courses 1 and 41. Introduction to human information processing, mental representation and transformation, imagery, attention, memory, language processing, concept formation, problem solving, and computer simulation. Not open for credit to students who have completed former course 136.—I, II, III. (I, II, III.) Ekstrom, Gibbsl, Long, Luck

101. Introduction to Psychobiology (4)

Lecture—4 hours. Prerequisite: courses 1, 41. Survey and integration of the relationships between behavior and biological processes, including physiology, genes, development, ecology, and evolution.—I, II, III. (I, II, III.) Coss, Krubitzer, Owings, Schank, Trainor

103A. Statistical Analysis of Psychological Data (5)

Lecture—4 hours; laboratory—2 hours; term paper. Prerequisite: course 1, 41 and Statistics 13 or 102. Pass 1 open to Psychology majors. Design and statistical analysis of psychological investigations and the interpretation of quantitative data in psychology. Not open for credit to students who have completed course 103.—I, II. (I.) Blozis, Grimm, Widaman

103B. Statistical Analysis of Psychological Data (4)

Lecture—4 hours. Prerequisite: course 103A and Statistics 13 or 102. Pass 1 open to Psychology majors. Probability theory, sampling distributions, hypothesis testing, statistical inference, one-way and two-way analysis of variance, nonparametric statistics, with applications in psychology. Not open for credit to students who have completed course 105.—III. (II, III.) Blozis, Ferrer, Grimm, Widaman

104. Applied Psychometrics: An Introduction to Measurement Theory (4)

Lecture—4 hours. Prerequisite: upper division standing in Psychology, courses 41 and 103, Statistics 13. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis and latent trait theory.—Grimm, Widaman

107. Questionnaire and Survey Research Methods (4)

Lecture/discussion—2 hours; laboratory/discussion—2 hours. Prerequisite: consent of instructor; course 1; course 41 or an equivalent course on social or behavioral research methods. Introduction to survey and questionnaire research methods with emphasis on how to ask questions. Social and psychological factors that influence survey response. Practical aspects of fielding survey and questionnaire research. Limited enrollment. Not offered every year.—Herek

113. Developmental Psychobiology (4)

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 101. The biology of behavioral development; survey and integration of the organismic and environmental processes that regulate the development of behavior.—I, II. (II, III.) Schank, Owings

120. Agent-Based Modeling (4)

Lecture/laboratory—4 hours. Prerequisite: course 100 or 101. Introduction to agent-based computer simulation and analysis with emphasis on learning how to model animals, including humans, to achieve insight into social and group behavior. Limited enrollment.—Schank

121. Physiological Psychology (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 1, 41, 101. Pass 1 open to Psychology majors. Relationship of brain structure and function to behavior, motivation, emotion, language, and learning in humans and other animals. Methodology of physiological psychology and neuroscience. Not open for credit to students who have completed course 108. (Former course 108.)—I, II, III. (I, II, III.) Bales, Krubitzer

122. Advanced Animal Behavior (4)

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 101 or Neurobiology, Physiology, and Behavior 102. Pass 1 open to Psychology majors. Advanced integrative survey of biological principles of behavioral organization, emphasizing historical roots, current research directions, conceptual issues and controversies. Laboratory exercises on the description and analysis of the behavior of captive and free living animals. (Same course as Neurobiology, Physiology, and Behavior 150.) Not open for credit to students who have completed course 150. (Former course 150.)—III. (III.) Owings, Scheib

123. Hormones and Behavior (3)

Lecture—3 hours. Prerequisite: Neurobiology, Physiology, and Behavior 101 and either course 101 or Neurobiology, Physiology, and Behavior 102. Pass 1 open to Psychology majors. Endocrine physiology with an emphasis on the principles of behavior. Fundamental relationships between hormones and various behaviors engaged in by the organism during its lifetime. Role of hormones in behavioral homeostasis, social behavior, reproductive behavior, parental behavior, adaptation to stress. (Same course as Neurobiology, Physiology, and Behavior 152.) Not open for credit to students who have completed course 152. (Former course 152.)—III. (III.) Bales

124. Comparative Neuroanatomy (4)

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 101 or Neurobiology, Physiology, and Behavior 100 or 101. Overview of the neuroanatomy of the nervous system in a variety of mammalian and non-mammalian vertebrates. Examine changes or modifications to neural structures as a result of morphological or behavioral specializations. (Same course as Neurobiology, Physiology, and Behavior 124.)—II. (II.) Krubitzer, Recanzone

126. Health Psychology (4)

Lecture—4 hours. Prerequisite: course 1, 41, 101. Pass 1 open to Psychology majors only. Psychological factors influencing health and illness. Topics include stress and coping, personality and health, symptom perception and reporting, heart disease,

cancer, compliance, and health maintenance and promotion. Not open for credit to students who have completed course 160.—II, III. (II, III.) Emmons

127. Animal Cognition (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: courses 1, 41, 101. Pass 1 open to Psychology majors. Integrative review of the historical backdrop, theoretical issues, and scientific methods of studying animal cognition in a wide range of species. Emphasis on learning processes, pattern recognition, and the neurobiology of learning and memory. Not open for credit to students who have completed course 134. (Former course 134.)—II. (II.) Coss

129. Sensory Processes (4)
Lecture—3 hours; term paper. Prerequisite: course 1, 41, 101. Pass 1 open to Psychology majors. Psychobiology of sensory systems in humans and other animals. The relationship of behavior to the physiology, structure, and function of the senses. GE credit: Wrt.—I, II, III. (I, II, III) Krubitzer

130. Human Learning and Memory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1, 41, 100, and either Statistics 13 or 102; or consent of instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data.—I, II, III. (I, II, III.) Ranganath, Yonelinas

131. Perception (4)
Lecture—3 hours; independent library work. Prerequisite: courses 1, 41. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.—I, II, III. (I, II, III.) Geng, Post

132. Language and Cognition (4)
Lecture—3 hours; term paper. Prerequisite: courses 1, 41, 100; or consent of instructor. Introduction to the cognitive processes involved in language comprehension and production. Topics include the biological foundations of language, speech perception, word recognition, syntax, reading ability, and pragmatics.—I, II, III. (II, III.) Long, Swaab, Traxler

135. Cognitive Neuroscience: The Biological Foundations of the Mind (4)
Lecture—3 hours; writing. Prerequisite: courses 1, 41, and 100 or 131, or consent of instructor; course 101, 121, or 129 recommended. Neuroscientific foundations of higher mental processes including attention, memory, language, higher-level perceptual and motor processes, and consciousness. Emphasis on the neural mechanisms which form the substrates of human cognition, and the relationship of mind to brain.—I, II. (I, II.) Ekstrom, Geng, Janata, Mangun, Raganath

136. Psychology of Music (4)
Lecture/discussion—3 hours; term paper. Prerequisite: courses 1, 41, and either 100 or 131 or Music 6C; or consent of instructor. Introduction to the mental and neural representations of musical structures and processes involved in perceiving, remembering, and performing music. Music and emotion.—Janata

140. Developmental Psychology (4)
Lecture—4 hours. Prerequisite: courses 1, 41. Pass 1 open to Psychology majors. Ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction. Two units of credit allowed to students who have completed Human Development 100A or 100B. Not open for credit to students who have completed course 112. (Former course 112.)—I, II, III. (I, II, III.) Ghetti, Gibbs, Goodman, Lagattuta, Oakes

141. Cognitive Development (4)
Lecture—3 hours; term paper. Prerequisite: Human Development 100A or 100B or course 140. Pass 1 restricted to Human Development or Psychology majors. Theories, methods, evidence, and debates in the field of cognitive development, such as nature/nurture, constraints on learning, and the role of plasticity. Topics include attention, memory, concepts about the physical and social world, and language. (Same course as Human Development 101.) GE credit: Wrt.—I, II, III. (I, II, III.) Chen, Ghetti, Gibbs, Goodman, Graf Estes, Lagattuta, Rivera

142. Social and Personality Development (4)
Lecture—3 hours; term paper. Prerequisite: Human Development 100A or 100B or course 140. Pass 1 open to Human Development or Psychology majors. Social and personality development of children, infancy through adolescence. Topics include the development of personality, achievement motivation, self-understanding, sex-role identity, and antisocial behavior. Emphasis on the interface between biological and social factors. (Same course as Human Development 102.) GE credit: SocSci, Wrt.—I, II, III. (I, II, III.) Conger, Gibbs, Hastings, Robins, Thompson

143. Infant Development (4)
Lecture—3 hours; lecture/discussion—1 hour; extensive writing. Prerequisite: courses 1 and 41, and either course 140 or Human Development 100A. Psychological development in infancy. Topics include physical and motor development, sensory and nervous system development, and memory and cognitive development. Emphasis will be on evaluating theories, empirical research, and experimental methods for understanding infant development.—II. (II.) Oakes

146. The Development of Memory (4)
Lecture—3 hours; term paper. Prerequisite: courses 1, 41. Pass 1 open to Psychology majors. Theory and research on memory development with focus on infancy and childhood. Not open for credit to students who have completed course 133. (Former course 133.)—II. (III.) Ghetti, Goodman, Rivera

148. Developmental Disorders (4)
Lecture/discussion—3 hours; term paper. Prerequisite: courses 1, 41, and either 140 or 141 or Human Development 100A or 100B. Current scientific knowledge of the influences of biological, cognitive, and environmental factors on the emergence of disorders with onset in childhood. Examples include autism spectrum, ADD/ADHD, dyslexia and dyscalculia. Emphasis placed on understanding these disorders, their causes and their treatments.—II, III. Rivera

151. Social Psychology (4)
Lecture—4 hours. Prerequisite: courses 1, 41. Pass 1 open to Psychology majors. Behavior of the individual in the group. Examination of basic psychological processes in social situations, surveying various problems of social interaction; group tensions, norm-development, attitudes, values, public opinion, status. Not open for credit to students who have completed course 145. (Former course 145.)—I, II, III. (I, II, III.) Johnson, Ledgerwood, Pickett, Shaver, Sherman

152. Social Cognition (4)
Lecture—4 hours. Prerequisite: courses 1 and 41. Examines how social factors influence how we attend to, encode, and process information and how these mental processes affect subsequent judgments and behavior.—III. (I, II, III.) Johnson, Pickett, Sherman

153. Psychology and Law (4)
Prerequisite: courses 1, 41. Pass 1 open to Psychology majors. Current theoretical and empirical issues in the study of psychology and law. Topics include eyewitness testimony, child abuse, jury decision making, juvenile delinquency and criminology, prediction of violence, insanity defense, and memory for traumatic events. Not open for credit to students who have completed course 115. (Former course 115.) Offered in alternate years.—III. Goodman, Johnson

154. Psychology of Emotion (4)
Lecture—4 hours. Prerequisite: course 1, 41. Pass 1 open to Psychology majors. Introduction to current theories and research on emotion and bodily feelings with special reference to self-knowledge. Not open for credit to students who have completed course 143. (Former course 143.)—I, II, III. (I, II, III.) Robins, Shaver

155. Environmental Awareness (4)
Lecture—4 hours. Prerequisite: course 1. Pass 1 open to Psychology majors. Interactions of people and the environments they construct. Research methods for evaluating designed environments and reviews of current research in environmental psychology. Not open for credit to students who have completed course 144. (Former course 144.) GE credit: SocSci—I. (I.) Coss

157. Stereotyping, Prejudice, and Stigma (4)
Lecture/discussion—3 hours; term paper. Prerequisite: Psychiatry 151. Social psychological underpinnings of stereotyping, prejudice, and stigma from sociocultural, motivational, and cognitive perspectives. Topics include: origins, maintenance, change, effects on person perception and memory, and the automaticity/controllability of stereotyping and prejudice. Offered in alternate years.—Sherman

158. Sexual Orientation and Prejudice (4)
Lecture/discussion—4 hours. Prerequisite: course 1, 41. Pass 1 open to Psychology majors. Current scientific knowledge about sexual orientation and prejudice based on sexual orientation. Emphasis on learning the skills necessary for a critical understanding of science and public policy issues relevant to sexuality. GE credit: SocSci, Div, Wrt.—II. (III.) Herek

159. Gender and Human Reproduction (4)
Lecture—4 hours. Prerequisite: course 1 and 41. Pass 1 open to Psychology majors. Psychology of reproduction. Reproductive events over the course of an individual's life, including sexual development, mate choice, relationships, and reproduction. Biological and social psychological explanations at the levels of mechanism and evolutionary function. Not open for credit to students who have completed former course 149. (Formally course 149.)—III. Scheib

161. Psychology of the Self (4)
Lecture—4 hours. Prerequisite: courses 1 and 41. Psychological theory and research on the self. Topics include: self-knowledge, self-esteem, self-regulation, self-presentation, cognitive and emotional aspects of the self, and the role of the self in shaping social interaction.—II. (I, II, III.) Pickett, Robins

162. Personality Theory (4)
Lecture—4 hours. Prerequisite: courses 1, 41. Pass 1 open to Psychology majors. The theories of Freud, Erikson, and other major twentieth-century contemporary approaches to personality. Not open for credit to students who have completed course 147. (Former course 147.) GE credit: SocSci, Wrt.—I, II, III. (I, II, III.) Emmons, Robins, Shaver

165. Introduction to Clinical Psychology (4)
Lecture—4 hours. Prerequisite: courses 1, 41, 168, and either 140 or 151. Major theoretical formulations in the history of clinical psychology, from classical psychoanalysis to contemporary existentialism and behavior modification. A survey, based on lectures, films, and tapes, of what clinical psychologists do, including methods of appraisal, professional roles, and approaches to treatment.—I, II, III. (I, II, III.) Horn, Sue, Zane

168. Abnormal Psychology (4)
Lecture—4 hours. Prerequisite: courses 1, 41. Descriptive and functional account of behavioral disorders, with primary consideration given to neurotic and psychotic behavior. GE credit: SocSci.—I, II, III. (I, II, III.) Emmons, Schepeler, Sue, Zane

170. Psychology of Religion (4)
Lecture—4 hours. Prerequisite: courses 1 and 41. Major theories, issues, data, and research methodologies of the psychology of religion. Religious experience and expression; religious development in childhood, adolescence, and adulthood; conversion; religious influences on physical and mental health; cross-cultural perspectives. GE credit: Div, Wrt.—II, III. (II, III.) Emmons

175. Genius, Creativity, and Leadership (4)
Lecture—3 hours; term paper. Prerequisite: course 1 and 41 or the equivalent or consent of instructor. The phenomenon of genius examined from a diversity of theoretical, methodological, and disciplinary perspectives, with an emphasis on outstanding creativity

and leadership in art, music, literature, philosophy, science, war, and politics. GE credit: SocSci, Wrt.—I, III. (I, III.) Simonton

180A. Research in Cognitive and Perceptual Psychology (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of instructor. Empirical research on selected topics in general experimental psychology (general research design and analysis, perception, cognition, cognitive development, etc.). Specific content will vary from quarter to quarter. May be repeated one time for credit when content differs.—I. (II, III.)

180B. Research in Psychobiology (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 101, three additional upper division courses in Psychology, and consent of instructor. Empirical research on selected topics in psychobiology (animal learning, animal behavior, physiological and sensory psychology, developmental psychobiology, computer modeling of neural systems). Content varies. May be repeated one time for credit when content differs.—III. (III.)

180C. Research in Personality and Social Psychology (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 41, and four upper division Psychology courses and consent of instructor. Empirical research on selected topics in personality and social psychology (personality, social psychology, organizational psychology, etc.). Content will vary from quarter to quarter. May be repeated one time for credit when specific content differs.

185. History of Psychology (4)
Lecture—3 hours; term paper. Prerequisite: courses 1, 41, upper division standing or consent of instructor. Pass 1 open to Psychology majors. Development of psychological thought and research in context of history of philosophy and science. Not open for credit to students who have completed course 120. (Former course 120.) GE credit: SocSci, Wrt.—II. (II.) Simonton

190. Seminar in Psychology (4)
Seminar—4 hours. Prerequisite: junior or senior standing; major in psychology or consent of instructor. Intensive treatment of a special topic or problem of psychological interest. May be repeated for credit in different subject area.—II, III. (II, III.)

190X. Upper Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite: upper division standing and consent of instructor. In-depth examination at an upper division level of a special topic in Psychology. Emphasis on student participation in learning. May not be repeated for credit. Limited enrollment.

192. Fieldwork in Psychology (1-6)
Fieldwork—1-6 hours. Prerequisite: upper division standing in psychology and consent of instructor. Supervised internship off and on campus, in community and institutional settings. Maximum of four units may be used towards satisfaction of upper division major requirement. May be repeated one time for credit. Limited enrollment (P/NP grading only.)

194HA-194HB. Special Study for Honors Students (3-3)
Independent study—9 hours. Prerequisite: senior standing in Psychology and qualifications for admission into college honors program, and consent of instructor; at least one course from 180A, 180B, 180C or 199 strongly recommended. Directed research. Supervised reading, research and writing leading to submission of a Senior Honors thesis under the direction of faculty sponsor. (Deferred grading only, pending completion of sequence.)

197T. Tutoring in Psychology (1-3)
Tutoring—1-3 hours. Prerequisite: upper division standing and consent of instructor. Intended for advanced undergraduate students who will lead discussion sections in Psychology courses. May be repeated for credit for a total of 8 units. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

200. Proseminar in Psychology (3)
Seminar—2 hours; independent study—1 hour. Prerequisite: graduate standing in Psychology or consent of instructor. Introduces matriculating graduate students to research activities of departmental faculty. (S/U grading only.)—I. (I.)

201. Research Preceptorship (4)
Laboratory—3-4 hours; discussion—3-5 hours. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

202. Research Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing in psychology. Presentation of graduate research to program faculty and graduate students. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

204A. Statistical Analysis of Psychological Experiments (4)
Lecture—4 hours. Prerequisite: Statistics 102 or the equivalent and graduate standing in Psychology or consent of instructor. Probability theory, sampling distributions, statistical inference, and hypothesis testing using standard parametric and correlational approaches. Analysis of variance, factorial and repeated measures, and tests of trends. Not open for credit to students who have completed course 206.—I. Ferrer, Widaman

204B. Causal Modeling of Correlational Data (4)
Lecture—4 hours. Prerequisite: course 204A or the equivalent or consent of instructor. Examination of how to make causal inferences from correlational data in the behavioral sciences. Emphasis on testing rival causal models using correlations among observed variables. Beginning with multiple regression analysis, discussion advances to path analysis and related techniques.—II. Simonton

204C. Applied Psychometrics and Measurement Theory (4)
Lecture—4 hours. Prerequisite: course 204A or the equivalent or consent of instructor. Examination of the basic principles and applications of classical and modern test theory. Topics include test construction, reliability theory, validity theory, factor analysis, and latent trait theory. Not open for credit to students who have completed course 204. (Former course 204.) Offered in alternate years.—III. Widaman

204D. Advanced Statistical Inference from Psychological Experiments (4)
Lecture—4 hours. Prerequisite: course 204A or the equivalent or consent of instructor. Advanced topics in statistical inference, which may include probability theory, sampling distributions, statistical inference and hypothesis testing, nonparametric statistics, Bayesian approaches, and advanced issues in analysis of variance. Not open for credit to students who have completed course 205. (Former course 205.) Offered in alternate years.—III. Blozis

205A. Applied Multivariate Analysis of Psychological Data (4)
Lecture—4 hours. Prerequisite: three courses from 204A, 204B, 204C, 204D or the equivalents, or consent of instructor. Review of the major methods of multivariate data analysis for psychological data. Statistical routines using a linear algebra-based computing language. Topics include multivariate analysis of variance, discriminant analysis, canonical analysis factor analysis, and component analysis. Not open for credit to students who have completed course 207B. (Former course 207B.) Offered in alternate years.—II. Ferrer

205B. Factor Analysis (4)
Lecture—4 hours. Prerequisite: graduate standing, course 204A and 204B or the equivalent or consent of instructor. Theory and methods of factor analysis, including exploratory factor analysis, confirmatory factor analysis, and principal component analysis. Offered in alternate years.—II. Widaman

205C. Structural Equation Modeling (4)
Lecture—3 hours; term paper. Prerequisite: graduate standing; course 204A and 204B or the equivalent or consent of instructor. Theory and methods of structural equation modeling, including path analysis, confirmatory factor analysis, multiple-group modeling and latent growth curve modeling. Offered in alternate years.—Ferrer, Grimm, Widaman

205D. Multilevel Models (4)
Lecture—4 hours. Prerequisite: course 204A, graduate standing or consent of instructor. Introduction to statistical techniques for the analysis of normal, hierarchically structured data, such as cross-sectional clustered data or repeated-measures data. Topics include hierarchical linear models, latent growth curve models, and how these methods handle unbalanced and/or missing data.—II. (II.) Blozis

206A. Theoretical Foundations: Research Methods in Psychology (4)
Lecture/discussion—3 hours; term paper. Restricted to graduate student status. Examines the philosophy and research practices underlying experimental psychology. Topics to be covered include philosophy of science/epistemology, research design, inference and bias in research, theory development, validity, the social context of research, and critical thinking about research. Offered irregularly.—III. (III.) Pickett, Sherman

206B. Research Methods in Psychology: Applications in Social-Personality Research (4)
Lecture/discussion—3 hours; term paper. Restricted to graduate student status. Overview of the research designs, assessment methods, and statistical procedure used by social-personality psychologists. Focus on the practical issues that arise when using each method in specific research contexts. Offered in alternate years.—(II.) Robins

207. Survey and Questionnaire Research Methods (4)
Lecture/discussion—4 hours. Prerequisite: completion of a course on social or behavioral research methods, graduate standing. Survey and questionnaire research methods with emphasis on how to ask questions. Cognitive, motivational, and social processes that influence how respondents answer questions; sampling techniques; Internet resources; practical aspects of fielding survey and questionnaire research. Not offered every year.—I. Herek

208. Physiological Psychology (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. A conceptual analysis of the contributions of neuroanatomy, neurophysiology and neurochemistry to an understanding of animal and human behavior.

209A. Introduction to Programming: Matlab (4)
Lecture/laboratory—3 hours. Prerequisite: graduate standing or consent of instructor. The Matlab programming environment as a means of organizing, analyzing, and visualizing scientific data. Basic programming concepts such as variables, loops, conditional branching, and efficient programming techniques will be emphasized. Not offered every year.—Janata

210. Fundamentals of Cognitive Neuroimaging (3)
Lecture/discussion—3 hours. Prerequisite: basic knowledge of inferential statistics and experimental psychology. Introduction to empirical foundations and methodology of neuroimaging, emphasizing pragmatics of functional magnetic resonance imaging (fMRI) to study cognition. Topics include MR physics, the relationship between neural activity and the BOLD response, experimental design, and analysis of fMRI data.—Ranganath

211. Advanced Topics in Neuroimaging (2)
Seminar—2 hours. Prerequisite: Psychology 210 or consent of instructor. Critical presentation and discussion of the most influential advanced issues in neuroimaging, emphasizing fMRI design/analysis and the integration of fMRI with EEG/MEG. Limited enrollment. (Same course as Neurobiology, Physiology and Behavior 211 and Neuroscience 211.) (S/U grading only.)—II. (II.) Miller

212A. Developmental Psychology: Cognitive and Perceptual Development (4)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor, completion of undergraduate or graduate course on developmental psychology or human development. Theories and empirical findings concerning human cognitive and perceptual development. Development of perception, memory, concepts (e.g., theory of mind, concepts about number), problem solving, and language from infancy to adolescence.—II. Ghetti, Goodman, Graf Estes Lagattuta, Rivera

212B. Developmental Psychology: Social, Emotional, and Personality Development (4)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor, completion of an undergraduate or graduate course on developmental psychology or human development. Theories and empirical findings concerning human social, emotional, and personality development. Development of emotions, moral reasoning and behavior, personality, self-concept, and social cognition from infancy to adolescence (may include adulthood).—Thompson

217. Behavioral Genetics (4)
Lecture—3 hours; laboratory/discussion—1hours; term paper. Prerequisite: graduate standing. Restricted to 20 students. Review basic principles in genetics and select topics in molecular genetics with emphasis on behavior. Use of modern molecular methods to outline complex relationships between genes, environment, and behavior. Not open for credit to students who have completed course 251.—II, III. (II, III.) Trainor

218A. Fundamentals of Animal Behavior (5)
Lecture/discussion—4 hours; discussion—1 hour. Prerequisite: consent of instructor; upper-division undergraduate introduction to the biology of behavior, such as course 101, 122, 123, Neurobiology, Physiology, and Behavior 102, 150, 152, Wildlife, Fish, and Conservation Biology 141, Entomology 104, or Animal Science 105. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Same course as Animal Behavior 218A.)—I. (I.) Owings, Sih

218B. Fundamentals of Animal Behavior (5)
Lecture/discussion—4 hours; discussion—1 hour. Prerequisite: consent of instructor; course 209A. Survey of the phenomena and theory of animal behavior from the perspectives of multiple biological disciplines, including evolution, ecology, psychology, genetics, neurobiology, endocrinology, and animal science. (Same course as Animal Behavior 218B.)—II. (II.) Owings, Sih

220. History of Psychology (4)
Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in psychology or consent of instructor. A lecture-seminar on the history of psychology and on the applicability of early psychological theory and research to contemporary investigations. Offered in alternate years.—Simonton

230. Cognitive Psychology (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Analysis of the mental processes by which knowledge is acquired, manipulated, stored, retrieved and used. Offered in alternate years.—I. Long, Mangun

231. Sensation and Perception (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Analysis of the role of sensory processes and perception in experience and their effects on behavior. Offered in alternate years.—III. Post

243. Social Cognition (4)
Lecture/discussion—3 hours, term paper. Prerequisite: consent of instructor. Processes underlying the perception, memory, and judgment of social stimuli, the effects of social and affective factors on cognition, and the interpersonal consequences of those processes. Topics include automaticity/control, motivated cognition, person perception, stereotyping, attitudes, and persuasion. Not offered every year.—Pickett, Sherman

244. Stereotyping, Prejudice, and Stigma (4)
Lecture/discussion—3 hours, term paper. Prerequisite: consent of instructor. This course examines the social psychological underpinnings of stereotyping, prejudice, and stigma, including sociocultural, motivational, and cognitive factors. Not offered every year.—I, II, III. (I, II, III.) Herek, Sherman

245. Social Psychology (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.—I. (III.) Johnson, Pickett, Robins

247. Personality (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in human personality.—II. (II.) Emmons, Robins

250. Comparative Psychology (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The study of animal behavior in an evolutionary and comparative framework.—II. Owings

251. Topics in Genetic Correlates of Behavior (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and experiment in the genetic contributions to animal and human behavior. May be repeated for credit when topic differs. Offered in alternate years.

252. Topics in Psychobiology (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Critical study in a selected area of psychobiology. May be repeated for credit when content differs. Offered in alternate years.—(I.)

261. Cognitive Neuroscience (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: graduate student standing in Psychology or Neuroscience or consent of instructor. Graduate core course for neuroscience. Neurobiological bases of higher mental function including attention, memory, language. One of three in three-quarter sequence. (Same course as Neuroscience 223.)—III. (III.) Ranganath, Swaab

263. Topics in Cognitive Psychology (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Selected topics in language processing, memory, perception, problem solving, and thinking, with an emphasis on the common underlying cognitive processes. May be repeated for credit when content differs. Offered in alternate years.—(I.)

264. Topics in Psycholinguistics (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Discussion of fundamental issues in the psychology of language. May be repeated for credit when content differs. Offered in alternate years.

265. Topics in Psychology of Consciousness (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in the psychology of consciousness. May be repeated for credit when content differs. Offered in alternate years.

270. Topics in Personality and Social Psychology (4)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Critical study of a selected area of personality or social psychology. May be repeated for credit when topic differs.—I. (I.)

272. Topics in Developmental Psychology (4)
Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Selected topics in developmental psychology, including developmental neuroscience, memory development, infancy, cognitive development, social development, child maltreatment, children and law, perceptual development, emotional development, children at risk, and adolescence, with emphasis on developmental processes and developmental theory. May be repeated for credit. Not offered every year.

289A. Current Research in Psychology (2)
Seminar—2 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Contemporary theory and empirical research in specialized topics in psychology. Topics include developmental attachment, social neuroscience, mental health, emotion, sexual orientation and identity. May be repeated for credit if topic differs. (Deferred grading only, pending completion of sequence.)—I, II. (I, II.)

289B. Current Research in Psychology (2)
Discussion—2 hours. Prerequisite: course 289A; graduate standing in Psychology or consent of instructor. Intensive examination of contemporary theory and empirical research on a specialized topic in psychology. Sample topics include developmental attachment, social neuroscience, culture and mental health, electrophysiology and cognitive neuroscience, emotion, implicit cognitive processes, sexual orientation and identity, and attention. May be repeated for credit if content differs. (Deferred grading only, pending completion of sequence.)—II, III. (II, III.)

290. Seminar (4)
Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Seminar devoted to a highly specific research topic in any area of basic psychology. Special topic selected for a quarter will vary depending on interests of instructor and students.—I, II, III. (I, II, III.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (2-9)
(S/U grading only.)

299D. Dissertation Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

390A-390B. The Teaching of Psychology (6-4)
Discussion, lecture, practice. Prerequisite: advanced graduate standing in psychology or a closely related discipline and consent of instructor. Methods and problems of teaching psychology at the undergraduate and graduate levels; curriculum design and evaluation. Practical experience in the preparation and presentation of material. (S/U grading only; deferred grading only, pending completion of sequence.)—II-III. (II-III.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Quantitative Biology and Bioinformatics

(College of Biological Sciences)

The interdisciplinary minor in Quantitative Biology and Bioinformatics is an integrative program that introduces students to the quantitative and computational approaches that are redefining all disciplines in the biological sciences, from molecular and cell biology, through genetics and physiology, to ecology and evolutionary biology. Students in this minor will learn research tools that apply mathematical and computational methods, increase their insight into the strengths and limitations of quantitative approaches, and develop the interdisciplinary perspective that is now the foundation of modern biological research and training.

The minor in Quantitative Biology and Bioinformatics is open to all undergraduates regardless of major and is sponsored by the College of Biological Sciences.

Minor Program Requirements:

UNITS

Quantitative Biology and Bioinformatics 18-24

Core Courses..... 8-12
Programming: Computer Science Engineering 10 or 30 or the equivalent* 4
Quantitative Biology: Biological Sciences 132 or Mathematics 124 4
Bioinformatics: Computer Science Engineering 124 or 129 4
Quantitative and Computational Preparation 4
Complete one course from the following: Applied Science Engineering 115; Computer Science Engineering 122; Mathematics 128A, 128B, 128C, 135A; Statistics 130A, 131A, 141A
Restricted Electives 6-8
Complete two or more courses from the following list to achieve a total of 18-24 units: Biomedical Engineering 117, 141, 151; Biotechnology 150; Computer Science Engineering 165A, 166; Evolution and Ecology 102, 103, 104, 175; Molecular and Cellular Biology 123, 143; Neurobiology, Physiology, and Behavior 105, 163; one course from Environmental Science and Policy 121 or Wildlife, Fish, and Conservation Biology 122; one course from Molecular and Cellular Biology 182 or Neurobiology, Physiology, and Behavior 131

Restrictions. No more than two upper division courses from a single department may be offered in satisfaction of the minor requirements. Only one course used to satisfy a requirement for the minor may be applied toward a student's major.

*The programming requirement may be satisfied by previous experience and therefore may not entail college course credit. Please see your minor adviser for this determination and its possible impact on your unit requirements for the minor.

Minor Adviser. Consult the College of Biological Sciences Dean's office in 202 Life Sciences (530) 752-0410.

Radiation Oncology

See Medicine, School of, on page 380.

Radiology

See Medicine, School of, on page 380.

Range Science

(College of Agricultural and Environmental Sciences)

Faculty. See Plant Sciences, on page 461.

Related Program. See Ecological Management and Restoration, on page 218.

Related Courses. See Plant Sciences 101, 112, 130, 131, 135; Nutrition 115: Soil Science 105, 120; Wildlife, Fish, and Conservation Biology 151.

Religious Studies

(College of Letters and Science)

Naomi Janowitz, Ph.D., Program Director

Program Office. 213 Sproul Hall
(530) 752-1219; *http://religions.ucdavis.edu*

Committee in Charge

Catherine Chin, Ph.D. *(Religion)*
Allison Coudert, Ph.D. *(History)*
Mark Elmore, Ph.D. *(Religious Studies)*
Naomi Janowitz, Ph.D. *(Religious Studies)*
Whalen Lai, Ph.D. *(Religious Studies)*
Flagg Miller, Ph.D. *(Linguistic Anthropology)*
Baki Tezcan, Ph.D. *(Religious Studies, History)*
Archana Venkatesan, Ph.D. *(Comparative Literature, Religious Studies)*
Moulie Vidas, Ph.D. *(Religious Studies)*
Keith Watenpaugh, Ph.D. *(History)*

Faculty

Catherine Chin, Ph.D., Assistant Professor
Allison Coudert, Ph.D., Professor
Mark Elmore, Ph.D., Assistant Professor
Naomi Janowitz, Ph.D., Professor
Whalen W. Lai, Ph.D., Professor
Flagg Miller, Ph.D., Professor
Baki Tezcan, Ph.D., Professor
Archana Ventakesan, Ph.D., Assistant Professor
Moulie Vidas, Ph.D., Assistant Professor
Keith Watenpaugh, Ph.D., Associate Professor

Emeriti Faculty

Lincoln D. Hurst, Ph.D., Professor Emeritus

The Major Program

Religion is a major force in human experience. It has shaped the world's history, literature, art, culture, politics, ethics, and economics. While religion has proven to be one of the greatest threats to world peace and prosperity, it has also laid the foundation for human rights, social justice, toleration, and world peace. In addition to offering courses in all the major religious traditions (Judaism, Christianity, Islam, Hinduism, Chinese and Japanese religions), the Religious Studies Program has developed cross-cultural courses dealing with religious symbols, myths, and rituals in written texts, art, theater, and film, and the internet as well as thematic courses dealing with such topics as religion and the body, the rise of fundamentalism, religion and science, and religion and violence.

The Program. The major introduces students to the academic study of religion. Students can choose from a broad range of courses both in the program itself and in other departments and programs-history, philosophy, sociology, anthropology, American studies, classics, and medieval studies. In addition to studying religious thought per se, students in the major can also study the way religion has shaped human behavior in such matters as family life, gender roles, ethics, artistic life, concepts of individual freedom, the pursuit of science, and economics. For some students, Religious Studies is an appropriate second major and combines well with anything from philosophy to international agricultural development, political science, and the physical sciences.

Career Alternatives. Because of the program's focus on developing critical thinking, writing, and reading skills, students who major in Religious Studies are well prepared to enter a variety of careers, including teaching, the health professions, law, business, and government. In an increasingly global society, knowledge of the world's religious traditions and practices has become an essential part of a student's education.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 20

(a) One course from the Religious Studies 1 series 4
(b) Four courses from other Religious Studies lower division offerings 16

Depth Subject Matter 40

Religious Studies 100..... 4
Nine upper division Religious Studies courses* 36
* Four of these courses may be upper division courses related to religion that are offered by other departments and taken with the approval of a Religious Studies adviser.

Total Units for the Major 60

Recommended. A reading knowledge of a foreign language is highly recommended.

Course Equivalents. The major advisers have a list of lower and upper division courses that can be substituted for courses suggested above.

Major Advisers. A. Coudert, F. Miller, B. Tezcan

Minor Program Requirements:

UNITS

Religious Studies 20

Lower division course 4
Upper division courses 16
Religious Studies 100 required.
Some substitutions from other departments or programs allowed with consent of adviser.

Jewish Studies. Students interested in Jewish studies should contact Diane Wolf *(Sociology)*

Courses in Religious Studies (RST)

Lower Division Courses

1. Survey of Religion (4)
Lecture—3 hours; discussion—1 hour. Basic concepts introduced through readings of the primary religious literature. Discussion of central ideas (creation, history, law, prophecy, suffering, mysticism, asceticism, karma, reincarnation, moksha, etc.); readings from the Bible, Bhagavad Gita, the Koran, selections from Plato and early Buddhist writings. GE credit: ArtHum, Div, Wrt.—II. (II.)

1A-F. Topics in Comparative Religion (4)
Lecture—3 hours; discussion—1 hour. Introduction to comparative religion, focusing on a particular theme in a number of religious traditions: (A) Pilgrimage; (B) Death and After-life; (C) Sacrifice; (D) Conversion; (E) Fundamentalism; (F) Contemporary Religion. Not available to those who have taken course 3A. GE credit: ArtHum, Div, Wrt.—I, II, III, IV. (I, II, III, IV.)

1G. Myth, Ritual, and Symbolism (4)
Lecture—3 hours; discussion—1 hour. Myths, rituals and religious symbols found in a variety of religious traditions including examples from ancient and contemporary religious life. Variety of religious phenomena; validity of different approaches to the study of religion. Not open to students who have taken Religious Studies 2 and received unit credit. GE credit: ArtHum, Div, Wrt.—I, III. (I, III.) Janowitz

10. Contemporary Ethical Issues (2)
Lecture—2 hours. This course presents challenging, contemporary perspective. Rotating topics will include Ethical Eating, Capital Punishment, Animal Rights. May be repeated for credit. GE Credit: Wrt.—II. (II.) Coudert, Janowitz

10A. Contemporary Ethical Issues (2)
Discussion—1 hour; extensive writing. Prerequisite: concurrent enrollment in course 10 required. Restricted to students enrolled in course 10. GE topical breadth and diversity credit only with concurrent enrollment in course 10. Discussion of the readings assigned for course 10 and completion of a major research paper. May be repeated for credit. GE Credit: ArtHum, Div, Wrt.—II. (II.) Coudert, Janowitz

21. Hebrew Scriptures (4)
Lecture—3 hours; term paper. Selected texts from the Hebrew Scriptures (Genesis—II Chronicles) and review of modern scholarship on the texts from a variety of perspectives (historical, literary, sociological, psychological). Course work is based on an English translation and no knowledge of Hebrew is required. GE credit: ArtHum, Div, Wrt.—I. (I.)

23. Introduction to Judaism (4)
Lecture/discussion—3 hours; term paper. Introduction to the study of religion using examples from the rituals, art and holy texts of Judaism. No prior knowledge of either Judaism or the study of religion is necessary. GE credit: ArtHum, Div, Wrt.—II. (II.)

30. Religions of South Asia (4)
Lecture—3 hours; term paper. Introduction to South Asian religions, including Hinduism, Buddhism, Islam, Jainism and Sikhism. Traces historical developments from Vedic texts and their ascetic reformulation by sages such as Yajnavalkya, Siddhartha Gautama, and Mahavira into our global present. GE credit: ArtHum, Div, Wrt.—I, II. (I, II.) Elmore, Venkatesan

40. New Testament (4)
Lecture—3 hours; discussion—1 hour. New Testament literature from critical, historical, and theological perspectives. GE credit: ArtHum, Wrt.—I. (I.) Chin

42. Religion and Science Fiction (4)
Lecture—3 hours; term paper. Representations of actual and fictional religious movements in science fiction and fantasy writing and film. Examination of: the characteristics of religion and religiosity in fictional religious movements; the relationship between religion, science, and technology in modern speculative fiction. Offered irregularly. GE credit: ArtHum, Div, Wrt.—I, II, III, IV. (I, II, III, IV.) Chin

45. Christianity (4)
Lecture/discussion—3 hours; term paper. Major concepts and practices in the Christian tradition. Survey of the history of Christianity and Christian expansion from antiquity to modern times. Offered in alternate years.—(I, II.) Chin

60. Introduction to Islam (4)
Lecture/discussion—3 hours; extensive writing. Introduction to topics central to the Islamic tradition. Muhammad, the Qur'an, Islamic law, theology, philosophy, cosmology, worship, and mysticism. Race and gender in Islam, Islamic revival, and varying experiences of Islam in different historical and cultural settings. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—(I.) Tezcan

65C. The Qur'an and Its Interpretation (4)
Lecture/discussion—3 hours; extensive writing. The Qur'an, its history, its various functions in the lives of Muslims, and its different interpretations. Quranic themes such as God and humankind, nature and revelation, eschatology and Satan. Islam and other religions; women, gender, and sexuality. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(III.) Tezcan

68. Hinduism (4)
Lecture—3 hours; writing. Hindu tradition from ancient to modern times. Multiplicity of religious forms within Hinduism with mention of Jainism, Buddhism, and Sikhism and their relation to the mainstream of Hindu religion. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—I.

70. Religion and Language (4)
Lecture/discussion—3 hours; term paper. Provides students with a basic toolkit for studying religious discourse in a variety of traditions. Concentrates on the sacred and profane, the wondrous and ordinary, the mystical and reasonable.—I, II, III. (I, II, III.) Miller

75. Introduction to Chinese Philosophy (4)
Lecture/discussion—4 hours. Introduction to Chinese philosophy from classical pre-modern times; emphasis on basic concepts and their impact on social conduct; the Age of Philosophers, the Han synthesis, the medieval Buddhist contribution. Not offered every year.

80. Religion, Gender, Sexuality (4)
Lecture/discussion—3 hours; term paper. Constructions of gender and sexuality within one or more religious traditions, pre-modern and modern. Emphasis on the interaction between religious, medical, and ethical definitions of the human body and sexual behavior. Offered in alternate years. GE credit: Div, Wrt.—II.

90. Human Rights (4)
Lecture/discussion—3 hours; term paper. Introduction to the interdisciplinary study of the origins, evolution, denial and protection of Human Rights. GE Credit: ArtHum, Div.—I, II. (I, II.) Watenpaugh

98. Directed Group Study (1-5)
Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

99. Special Study for Lower Division Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

100. Study of Religion: Issues and Methods (4)
Lecture—3 hours; term paper. Principal issues and methods of Religious Studies and associated fields.—III. (III.)

102. Christian Origins (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 40; course 23 recommended. Beginning of the Christian faith seen in relation to milieu in which it originated. Offered in alternate years.—(I.)

103. Medieval and Byzantine Christianity (4)
Lecture/discussion—3 hours; term paper. Prerequisite: courses 40 or 45. Christianity in Europe and the Near East from the year 600 to 1450. Focus on the development of Catholic and Orthodox traditions in ritual, art, and thought, with attention to interactions between regional groups, and Christian interaction with Islam. Offered irregularly. GE Credit: ArtHum, Div, Wrt.—I, II. Chin

104. Christianity 1450-1700 (4)
Lecture/discussion—3 hours; term paper. History of Reformation conflicts over the authority of scripture, the nature of man and the universe, and the basis of morality with the goal of understanding how these conflicts laid the foundation for the modern world. Offered irregularly. GE credit: ArtHum, Div, Wrt.—Coudert

106. Christianity in the Modern World (4)
Lecture—3 hours; term paper. Christianity in the 20th and 21st centuries. Relationship of Christianity to globalization, industrialization, mass media, and the contemporary secular state. Focus on Christianity in developing nations and on the relationship of established Christian institutions to new Christian movements. Offered irregularly. GE Credit: ArtHum, Div, Wrt.—I, II, III. (I, II, III.) Chin, Coudert

110. Life, Meaning and Identity (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 or 2 or upper division standing. Study of religious lives, the quest for meaning and for personal identity; how religions frame the problems of life; how cultural and personal crises affect youthful identity; the nature and structure of dreams, myths, and ideals. Offered in alternate years.—II.

115. Mysticism (4)
Lecture—3 hours; term paper. Prerequisite: one lower division Religious Studies course (except 10, 98, or 99). Historical and descriptive analysis of selected key figures in mystical traditions and readings of representative mystical texts. Analytic term paper. Offered every three-four years. GE credit: ArtHum, Div, Wrt.—(III.)

120. Religion, Magic and Science (4)
Lecture—3 hours; extensive writing. Religion, magic, and science from the middle ages to the present. Contrast between modern scientific methodology and religious and magical thinking. (Same course as Science and Technology Studies 120.) Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(I.) Coudert

122. Studies in Biblical Texts (4)
Lecture—3 hours; term paper. Prerequisite: course 21. Study of a book from the Prophets or writings from critical, historical, and religious perspectives. May be repeated one time for credit in different subject area.—III. (III.)

124. Topics in Judaism (4)
Lecture—3 hours; term paper. Prerequisite: course 23. Examination of selected aspects of Jewish life, religion, or literature. Potential topics include: Jewish Perspectives on Jesus; The Golem: History and Legend; Sexuality and Gender in Late Antique Judaism and Early Christianity. May be repeated for credit when topic differs.—II.

125. Dead Sea Scrolls, Apocrypha, and Pseudepigrapha (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 21 or 40 or consent of instructor. Survey of the Dead Sea Scrolls, apocryphal and pseudepigraphical writings of Judaism and Christianity and their historical, social, and religious importance. GE credit: Wrt.—II.

130. Topics in Religious Studies (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one from course 1, 2, 3A, 3B, or 3C or consent of instructor. Thematic study of a phenomenon in more than one religious tradition or of the relationship between religion and another cultural phenomenon. Topics may include archeology and the Bible, women and religion, religion and violence. May be repeated for credit when topic differs.—II, III.

131. Genocide (4)
Lecture/discussion—3 hours; term paper. Prerequisite: one course from courses 1, 2, 3A, 3B, 3C, 3E or permission of instructor. Comparative and critical study of the modern phenomenon of genocide from religious, ethical and historical perspectives. Offered in alternate years. GE credit: ArtHum, Div.—(I.) Watenpaugh

135. The Bible and Film (4)
Lecture—2 hours; term paper; film-viewing—3 hours. Prerequisite: Humanities 10 recommended. Examination of the uses of the Judeo-Christian scriptures in film. Topics include dramatic depictions of biblical stories, the tension between science and religion, allegorical treatments of biblical themes, and the problems of religious conviction.—III.

140. Christian Theology (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 40; course 102 recommended. Historical and systematic introduction to Christian doctrine, with attention to divergent traditions and the problem of orthodoxy and heresy.—I. (I.)

141A. New Testament Literature: Synoptic Gospels (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40. Life and thought of the early Church as reflected by the Synoptic Tradition—Matthew, Mark, Luke and Acts. Offered every third year to alternate with 141B, 141C. GE credit: ArtHum, Wrt.

141B. New Testament Literature: John (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40. Life and thought of the early Church as reflected by the Johannine Tradition—the Gospel

and letters of John. Offered every third year to alternate with 141A, 141C. GE credit: ArtHum, Wrt.—III.

141C. New Testament Literature: Paul (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40. Life and thought of the early Church as reflected by the Pauline tradition—the letters of Paul. Offered every third year to alternate with 141A, 141B. GE credit: ArtHum, Wrt.—(II.)

144. History of the Bible (4)
Lecture—3 hours; term paper. Prerequisite: course 23 or 40. History of the formation of the Christian biblical canon, with emphasis on differences between Christian traditions; survey of translations and adaptations of the Bible in and outside of Western Christianity; and brief history of issues in biblical interpretation. Offered irregularly. GE credit: ArtHum, Div, Wrt.—I, II, III. (I, II, III.) Chin

145. Contemporary American Religion (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 40 and History 17B recommended. Examination of several major movements and phenomena in twentieth-century American religion. Offered in alternate years.—II.

150. Religious Ethics (4)
Lecture/discussion—4 hours. Prerequisite: course 4. Study of the religious bases to ethics through concentration on the ethical tracts of one major tradition, or through a comparison of the attitudes of two or more traditions to a common ethical issue. Offered every three years.—(II.)

160. Introduction to Islamic Thought (4)
Lecture—3 hours; extensive writing. Prerequisite: course 60 recommended. The development of Islamic thought from the first centuries of Islam to the eighteenth century. Theology, philosophy, ethics, Sufism, historiography, political theory, fundamentalism, al-Farabi, al-Ghazzali, Ibn Rushd, Tusi, Ibn al-Arabi, Rumi, Molla Sadra, Ibn Khaldun, Ibn Abd al-Wahhab. Offered in alternate years. GE credit: ArtHum or SocSci, Div, Wrt.—II. Tezcan

161. Modern Islam (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 60 or consent of instructor. The response of Islam to modernity: secularism, reformism, fundamentalism. Islam and imperialism, women, media and immigration. Islamic modernism, political Islam, Islam in Europe and America. GE Credit: ArtHum, Div, Wrt.—II. (II.)

162. Introduction to Islamic Law (4)
Lecture—3 hours; extensive writing. Prerequisite: course 60 recommended. The development of Islamic law in the formative centuries of Islam, ca. 600-1000, as well as its adaptation to changing economic, social, and political conditions in subsequent periods. Legal schools, legal theory, the Shari'a, reformist movements, human rights. Offered in alternate years. GE credit: ArtHum or SocSci, Div. Wrt.—II. Tezcan

163. The Social Life of Islam (4)
Lecture—3 hours; term paper. Introduction to culture and social life in Muslim societies. Focus on the plurality of traditions in Muslim faith, reason, and everyday practice. Special attention to Muslim rituals, ethical values, verbal genres, family life, sexuality and veiling, and youth culture. Offered in alternate years.—II.

165. Islam in Asia (4)
Lecture/discussion—3 hours; extensive writing. Islam as a lived religion in the Indian sub-continent, Central Asia, China, and Southeast Asia. Emphasis is on primary sources studied comparatively and historically. GE credit: ArtHum, Div, Wrt.—III.

167. Iraq (4)
Seminar—3 hours; term paper. Origins, causes and ethical challenges of conditions in Iraq; larger historical, cultural and ethical dimensions of mass violence, war, liberation, neocolonialism, terrorism and resistance.—III. (III.) Watenpaugh

170. Buddhism (4)
Lecture—3 hours; term paper. Buddhism in its pan-Asian manifestations, from its beginning in India to its development in Sri Lanka and Southeast Asia, Central Asia, China and Japan; teachings and practices, socio-political and cultural impact. Offered in alternate years.—III.

172. Ch'an (Zen) Buddhism (4)
Lecture/discussion—3 hours; term paper. Doctrines and methods of the Ch'an Buddhism, both ancient and modern. Review of ritual techniques, including meditation.—II.

189. Senior Colloquium (4)
Seminar—3 hours; term paper. Prerequisite: consent of instructor. Primarily for seniors in Religious Studies. Discussion in depth of a problem in religion which requires the methods of several disciplines and is important in the encounter between religions.—II. (II.)

190. Seminar (4)
Seminar—3 hours; term paper. Prerequisite: consent of instructor; required of all Religious Studies majors. Allows majors to integrate their disciplined study of the field. Emphasis on current scholarly debate about the methods for analyzing and comparing diverse religious traditions.—(I.)

194HA-194HB. Special Study for Honors Students (1-5)
Independent study. Open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member approved by the Program Director, leading to a senior honors thesis on a religious studies topic. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

201. Methods and Issues in Religious Studies (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Focuses on controversies in the study of comparative religion. How is religion best defined? Are there methods unique to the study of religion? What does the study of religion contribute to the study of society in general? May be repeated two times for credit when topic differs. Offered in alternate years. (III.) Coudert

205. Religion and Media (4)
Lecture/discussion—3 hours; term paper. Many communities are finding global media technologies useful for religious practice. This course examines how religious revitalization is historically situated. A phenomenological approach will enable students to situate media and religion within the social and material world of practitioners.—IV. (IV.) Miller

210. Religion and Postcoloniality, or Savages, Civilization, and Spirituality (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. This course examines relations between religion and colonialisms. Using specific historical situations it explores some of our thorniest theoretical problems. Students acquire a solid understanding of postcolonial theory and the historical tools to critically engage religion in the present.—III. (III.) Elmore

212. Religion and Violence (4)
Seminar—3 hours; term paper. Comparative and critical study of the ideological, cultural, and theological relationship between forms of violence and religion and religious practice. Offered in alternate years.—(II.) Watenpaugh

215. Topics in the History of Christianity (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing. Selected topics in the history of Christianity. Intended for graduate students seeking to do advanced work in the study of Christianity. May cover issues in Christian thought from antiquity, the middle ages, the early modern or modern period. May be repeated for credit when topic differs. Offered irregularly.—I, II, III. (I, II, III.) Chin, Coudert

299. Directed Research (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Russian

(College of Letters and Science)

Gail E. Finney, Ph.D., Program Director

Program Office. 524 Sproul Hall
(530) 752-4999; http://russian.ucdavis.edu

Committee in Charge

Carlee Arnett, Ph.D. *(German and Russian)*
Gail Finney, Ph.D. *(German and Russian)*
Jenny Kaminer, Ph.D. *(German and Russian)*
Olga Stuchebrukhov, Ph.D. *(German and Russian)*

Faculty

Olga Stuchebrukhov, Ph.D., Assistant Professor

Emeriti Faculty

James Gallant, Ph.D., Lecturer Emeritus
Daniel Rancour-Laferriere, Ph.D., Professor Emeritus
Valerie A. Tumins, Ph.D., Professor Emerita

The Major Program

The Russian major introduces students to a culture rich in art, music, theater, film, language, and literature. The major offers an opportunity to learn skills needed to enter the fields of foreign affairs, world politics, and international trade, or to begin graduate work in literature, history, cultural studies and international relations.

The Program. The major program instructs students in speaking, understanding, reading, and writing the Russian language. The program also acquaints students with the intellectual and cultural contributions of the Russian world through the study of its literature, traditions, and institutions.

Internships and Career Alternatives. Russian majors may participate in internships where they can serve as translators and interpreters for schools and business firms throughout Northern California. Upon graduation, many Russian majors enter the business world or enter graduate programs in Slavic studies and international relations. The program encourages students to supplement their Russian studies with courses in related fields such as international relations, political science, computer science, cultural studies, or economics in order to maximize their career possibilities.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**0-27**
Russian 1 through 6; or the equivalent	0-27
Depth Subject Matter	**36**
Russian 101A, 101B, 101C	12
Russian 102 or 103 or 105	4
20 Additional upper division units chosen in consultation with adviser from the following selection of Literature and Culture courses taught in Russian and English	20
Russian 121, 123, 126, 127, 128, 129, 130, 139, 140, 141, 142, 150	
The elective upper-division courses in English can be satisfied in part by one or more courses in History, Political Science, Comparative Literature and other departments after consultation with, and prior approval of, the major advisor.	

The total of 36 upper-division units may include units earned in the Education Abroad Program.

Total Units for the Major..... 36-63

Major Adviser. Olga Stuchebrukhov

Minor Program Requirements:

UNITS

Russian..... 20

Russian 101A, 101B, 101C..... 12
Other upper division Russian courses..... 8

Honors and Honors Program. The honors program comprises at least one quarter of study under course 194H, which will include a research paper. For details consult the major advisor.

Study Abroad. Students who have completed one or two years of Russian language study can participate in the Education Abroad Program (EAP) in Moscow. Many of our students also participate in summer, semester, and year-long programs sponsored by CIEE and ACTR in St. Petersburg and Moscow.

Prerequisite Credit. Credit normally will not be given for a course if that course is the prerequisite for a course already completed.

Courses in Russian (RUS)

Lower Division Courses

Course Placement. Students who have learned Russian at home must consult the department for placement instructions. Students with two years of Russian in high school normally continue in Russian 2; those with three years, Russian 3; those with four years, Russian 4.

1. Elementary Russian (5)
Discussion—5 hours; laboratory—1 hour. Introduction to Russian grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed Russian 2 or 3 in the 10th or higher grade in high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)—I. (I.)

1A. Accelerated Intensive Elementary Russian (15)
Lecture/discussion—15 hours. Special 12 week accelerated, intensive summer session course that combines the work of courses 1, 2, and 3. Introduction to Russian grammar and development of all language skills in a cultural context with emphasis on communication. Not open to students who have completed course 1, 2, or 3—IV. (IV.) Arnett

2. Elementary Russian (5)
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of grammar and language skills developed in course 1.—II. (II.)

3. Elementary Russian (5)
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of grammar and language skills developed in course 2.—III. (III.)

4. Intermediate Russian (4)
Discussion—4 hours; laboratory—1 hour. Prerequisite: course 3. Grammar review and conversational practice.—I. (I.)

5. Intermediate Russian (4)
Discussion—4 hours; laboratory—1 hour. Prerequisite: course 4. Grammar review. Introduction to literature. Conversational practice.—II. (II.)

6. Intermediate Russian (4)
Discussion—4 hours; laboratory—1 hour. Prerequisite: course 5. Grammar review. Intermediate conversation and continued reading of literature.—III. (III.)

45. Russian Fantasy and Science Fiction (4)
Lecture/discussion—3 hours; extensive writing. Genres of fantasy and science fiction in Russian literature from pre-revolutionary to post-Soviet times. Topics include the role of science and the supernatural in literature, history and types of science fiction. GE credit: ArtHum, Div, Wrt.—III. (III.) Stuchebrukhov

98. Directed Group Study (1-5)
Discussion—1-5 hours. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

101A. Advanced Russian (4)
Lecture—2 hours; discussion—1 hour; recitation—1 hour. Prerequisite: course 6. Topics in Russian grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversation exercises utilizing literary and colloquial variants of current Russian speech.—I.

101B. Advanced Russian (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 101A or consent of instructor. Continuation of course 101A. Topics in Russian grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversational exercises utilizing literary and colloquial variants of current Russian speech.—II. (II.)

101C. Advanced Russian (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 101B. Continuation of course 101B. Topics in Russian grammar for the advanced student. Reading and discussion of journalistic texts and classic and contemporary literature. Conversational exercises utilizing literary and colloquial variants of current Russian speech.—III. (III.)

102. Russian Composition (4)
Lecture/discussion—3 hours; tutorial—1 hour. Prerequisite: course 6 or consent of instructor. Practice in writing Russian. One composition on a different topic each week. Topics include history, geography, politics, and literature of Russia; comparison of Russian and American lifestyles; current events. Conducted in Russian. Offered in alternate years. GE credit: ArtHum.—II.

103. Literary Translation (4)
Discussion—3 hours. Prerequisite: course 101C. Translation of Russian literary texts into stylistically equivalent idiomatic English. Offered in alternate years.—(III.)

105. Advanced Russian Conversation (4)
Recitation—3 hours; practice—1 hour. Prerequisite: course 6. Intensive conversational practice and discussion based on current events and contemporary texts. Offered in alternate years.—II.

121. Nineteenth-Century Russian Prose (4)
Lecture—3 hours; term paper. Prerequisite: course 101C or consent of instructor. Development of prose from Pushkin and Gogol, through Dostoevsky and Tolstoy, to Maxim Gorky. Other writers are selected sequentially: Turgenev, Goncharov, Pisemsky, Saltykov, Chekhov. Romanticism, the Natural School, critical realism, and psychological realism are covered. Conducted in Russian. Offered in alternate years. GE credit: ArtHum.—I.

123. Twentieth-Century Russian Prose (4)
Lecture—3 hours; term paper. Prerequisite: course 101C or consent of instructor. Examination of various trends including Symbolism, Neorealism, and Socialist Realism in development of prose. Readings from such writers as Bely, Gorky, Sholokhov, Pasternak, Solzhenitsyn and others. Conducted in Russian. Offered in alternate years. GE credit: ArtHum.—I.

126. The Russian Theater (4)
Lecture—3 hours; term paper. Prerequisite: course 101C or consent of instructor. The main works of Russian dramatists from Fonvizin to the present, including Gogol, Turgenev, Tolstoy, Ostrovsky, Chekhov, Blok, Mayakovsky, Kharms. Conducted in Russian. Offered in alternate years. GE credit: ArtHum.

127. Nineteenth-Century Russian Poetry (4)
Discussion—3 hours; term paper. Prerequisite: course 101C or consent of instructor. Introduction to the principles of Russian versification followed by historical and poetic analysis of the following figures: Derzhavin, Zhukovsky, Pushkin, Delvig, Baratynsky, Lermontov, Nekrasov, Tjutchev, and Fet. Conducted in Russian. Offered in alternate years. GE credit: ArtHum.—III.

128. Twentieth-Century Russian Poetry (4)
Discussion—3 hours; term paper. Prerequisite: course 101C or consent of instructor. Introduction to principles of Russian versification followed by historical and poetic analysis of the following figures: Brjusov, Blok, Akhmatova, Mandelshtam, Esenin, Mayakovsky, Khlebnikov, Pasternak, Evtushenko, Voznesensky, and Brodsky. Conducted in Russian. Offered in alternate years. GE credit: ArtHum.—III.

129. Russian Film (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: completion of Subject A requirement. History of Russian film; film and social revolution, the cult of Stalin, dissident visions; film and the collapse of the Soviet empire; gender and the nation in Russian film. Course taught in English; films are in Russian with English subtitles. Offered in alternate years. (Same course as Film Studies 129.) GE credit: ArtHum, Div, Wrt.—(II.)

130. Contemporary Russian Culture (4)
Lecture—3 hours; term paper. Current trends in Russian culture and the relationship between artists and the government. Topics include recent changes in the cultural scene, postmodernist trends in literature, visual art, film, and theater. Offered in alternate years. GE credit: ArtHum.—(III.)

139. Pushkin (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 101C or consent of instructor. The course covers three major periods of Pushkin's poetical works: his early Lyceum verse; his poetry of the early 1820s; and the mature period. The course also includes Pushkin's prose fiction, drama, and journalism. GE credit: ArtHum, Div.—I. (I.)

140. Dostoevsky (in English) (4)
Lecture—3 hours. Reading and analysis of Dostoevsky's principal works such as Crime and Punishment, The Idiot, The Brothers Karamazov, and The Diary. Study of social and political views as reflected in Dostoevsky's works. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(II.)

141. Tolstoy (in English) (4)
Lecture—3 hours. Study of Leo Tolstoy's literary evolution and moral quest. Readings include his Confession, a major novel such as War and Peace or Anna Karenina, and representative shorter fiction. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—I.

142. Women's Autobiography (in English) (4)
Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: any introductory course in literature. An examination of Russian women's autobiography from the 18th through the 20th centuries, emphasizing the way in which the genre of autobiography serves as a means of the writer's creation of herself, as opposed to her definition by others. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

150. Russian Culture (4)
Discussion—3 hours; term paper. Knowledge of Russian not required. Study of Russian culture in nineteenth and twentieth centuries. Brief introduction of the beginnings up to nineteenth century. Russian art, music, philosophy, church, traditions, and daily life. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—II. (II.)

192. Research Essay (2)
Prerequisite: a Russian literature course (may be taken concurrently). A research essay, based on primary and secondary sources, dealing in depth with a topic arising from or related to the prerequisite literature course. May be repeated for credit.

194H. Special Study for Honors Students (4)
Independent study—4 hours. Prerequisite: open only to majors of senior standing who qualify for honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Russian studies.

195H. Honors Thesis (4)
Independent study—4 hours. Prerequisite: course 194H. Writing an honors thesis, under the direction of a faculty member, on a topic in Russian studies.

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Science and Society

(College of Agricultural and Environmental Sciences)

David M. Rizzo, Ph.D., Program Director

Program Office. 156 Hutchison Hall

(530) 754-9506

Faculty

Arnold Bloom, Ph.D., Professor *(Plant Sciences)*
Richard M. Bostock, Ph.D., Professor *(Plant Pathology)*
James Carey, Ph.D., Professor *(Entomology)*
Gita Coaker, Ph.D., Assistant Professor *(Plant Pathology)*
Edward Caswell-Chen, Ph.D., Professor *(Nematology)*
Douglas R. Cook, Ph.D., Professor *(Plant Pathology)*
Peter Cranston, Ph.D., Professor *(Entomology)*
Randy Dahlgren, Ph.D., Professor *(Land, Air and Water Resources) Academic Senate Distinguished Teaching Award*
R. Michael Davis, Ph.D., Professor and Specialist in Cooperative Extension *(Plant Pathology)*
Lynn Epstein, Ph.D., Professor *(Plant Pathology)*
Albert Fischer, Ph.D., Professor *(Plant Sciences)*
Graham Fogg, Ph.D., Professor *(Land, Air and Water Resources)*
David Gilchrist, Ph.D., Professor *(Plant Pathology)*
Thomas R. Gordon, Ph.D., Professor *(Plant Pathology)*
John Harada, Ph.D., Professor *(Plant Biology) Academic Senate Distinguished Teaching Award*
Peter Hernes, Ph.D., Assistant Professor *(Land, Air and Water Resources)*
William R. Horwath, Ph.D., Professor *(Land, Air and Water Resources)*
Benjamin Z. Houlton, Ph.D., Assistant Professor *(Land, Air and Water Resources*
Marie Jasieniuk, Ph.D., Assistant Professor *(Plant Sciences)*
Susan B. Kaiser, Ph.D., Professor *(Textiles and Clothing)*
Annie King, Ph.D., Professor *(Animal Science)*
James D. Murray, Ph.D., Professor *(Animal Science)*
Terrence Nathan, Ph.D., Professor *(Land, Air and Water Resources)*
Donald Nevins, Ph.D., Professor *(Plant Sciences)*
Gregory Pasternack, Ph.D., Professor *(Land, Air and Water Resources)*
Kathryn Radke, Ph.D., Professor *(Animal Science)*
James H. Richards, Ph.D., Professor *(Land, Air and Water Resources)*
David Rizzo, Ph.D., Professor *(Plant Pathology)*
Pamela C. Ronald, Ph.D., Professor *(Plant Pathology)*
Wendy Silk, Ph.D., Professor *(Land, Air and Water Resources)*
Li Tian, Ph.D., Assistant Professor *(Plant Sciences)*
Barry W. Wilson, Ph.D., Professor *(Animal Science, Environmental Toxicology)*

The Program. Science and Society is an interdepartmental teaching program administered by the College of Agricultural and Environmental Sciences that offers students throughout the campus the opportunity to discover the connections that link the social, biological, and physical sciences with societal issues and cultural discourses. Course work examines discovery processes in relation to societal values, public policy and ethics, including issues associated with cultural diversity. Whenever possible, opportunities outside the classroom are included as part of the learning experience.

The Science and Society teaching program serves students of all majors and interests. It can allow lower division students who have not yet declared a major a meaningful context for exploring diverse subject matters. The minor for the program includes, in addition to Science and Society courses, upper division courses from both the College of Agricultural and Environmental Sciences and the College of Letters and Science in the areas of history and philosophy of science, policy and decision making, communication of science, and culture, ethics and applications.

Minor Program Requirements:

UNITS

Science and Society.....22-27

Science and Society 1 4
Science and Society 2, 5, 15, 20, 30....2-4
One course from each of the four following areas:
History and Philosophy of Science: Community and Regional Development 118, 162, History 185A, 185B, History and Philosophy of Science 150, Nature and Culture 100, Philosophy 107, 108, or 109..... 4
Policy and Decision Making: Agricultural and Resource Economics 120, 147, 150, Consumer Science 100, Environmental Science and Policy 160, 165, Political Science 175, Sociology 155, or 181 3-4
Communication of Science: Agricultural Education 172, Agricultural Management and Rangeland Resources 122, Anthropology 120, Communication 115, 130, 135, 138, 140, Community and Regional Development 174, Linguistics 163, Political Science 165.....3-4
Culture, Ethics and Applications: Agricultural Management and Rangeland Resources 101, Community and Regional Development 142, Environmental Science and Policy 126, 164, Fiber and Polymer Science 110, International Agricultural Development 104, Plant Biology 151, Plant Pathology 140, or Sociology 144.....3-4
Science and Society 120 3

Minor Adviser. D. M. Rizzo

Related Courses. See Agricultural and Resource Economics 120, 147, Agricultural Management and Rangeland Resources 1, 101, 122, Communication 115, 140, Community and Regional Development 118, 142, 162, 174, Avian Sciences 13, Environmental Science and Policy 126, 160, 164, 165, Fiber and Polymer Science 110, History 185A, 185B, History and Philosophy of Science 150, Nature and Culture 100, Plant Biology 12, Plant Pathology 140, Political Science 175, Wildlife, Fish, and Conservation Biology 10.

Courses in Science and Society (SAS)

Lower Division Courses

1. Critical Inquiry into Contemporary Issues (4)
Lecture/discussion—3 hours; discussion—1 hour. Contemporary issues, including global population trends, economic and environmental changes, cultural diversity and biodiversity, nutrition and food safety, fiber and textiles, changing consumer cultures. Inquiry processes emphasize ethics, multiple disciplines, and multiple perspectives. GE credit: SciEng or SocSci, Div, Wrt.—I. (I.) Caswell-Chen

2. Feeding the Planet: Influences on the Global Food Supply (3)
Lecture/discussion—3 hours. Scientific principles and dynamic interactions involved in food production, food processing, nutrition, shelf life and marketing from differing viewpoints. Physical, biological and social science issues influencing the availability and safety of the food supply worldwide. GE credit: SciEng or SocSci, Wrt.—II. (II.) Bostock, Davis

3. Science, Technology and Society (4)
Lecture—4 hours. Impact of developments in science and technology on the individual in society and how economics, politics, culture and values affect technological development. Not open for credit to students who have completed former course Applied Behavioral Sciences 18. GE credit: SciEng or SocSci, Wrt.—(III.)

4. Water in Popular Culture (3)
Film viewing—2 hours; discussion—1 hour; lecture—1 hour. Importance of water in many aspects of society as revealed through a survey of its depictions in film. GE credit: SciEng or SocSci, Wrt.—I. (I.) Pasternack

5. Pathways to Discovery: Science and Society (3)
Lecture/discussion—3 hours. Highlights a current issue and/or controversy found in contemporary society and looks at how this problem impacts and is affected by the physical, social and biological sciences. Course varies with topic offered. May be repeated two times for credit. Course not offered every year. GE credit: SciEng or SocSci, Wrt.

7. Terrorism and War (4)
Lecture—3 hours; discussion—1 hour; term paper. Exploration of terrorism and war from science and social sciences perspectives. Terrorist cells and groups; biological, chemical, nuclear, and environmental terrorism; intelligence gathering and espionage; military strategy; genocide; epochal wars; clash of civilizations; nation building; and future global scenarios. GE credit: Div, SciEng or SocSci, Wrt.—III. (III.) Carey

8. Water Quality at Risk (3)
Lecture—2 hours; discussion—1 hour. Natural and human threats to water quality. Balance of science and policy in all aspects of attaining, maintaining, and managing water quality, water contamination. Decoding popular media coverage of water quality and water contamination. GE credit: SciEng or SocSci, Wrt. (Same course as Environmental and Resource Sciences 8.)—II. (II.) Hernes

9. Crisis in the Environment (3)
Lecture—3 hours. Explores contemporary environmental issues by examining the causes, effects and solutions to a wide range of environmental problems facing the global ecosystem. Integrated discussion of political, societal and economic impact linkages with environmental problems. GE Credit: SciEng or SocSci, Wrt.—III. (III.) Dahlgren, Houlton

10. Water, Power, Society (3)
Lecture—2 hours; discussion—1 hour. Water resources issues. How water has been used to gain and wield socio-political power. Water resources development in California as related to current and future sustainability of water quantity and quality. Roles of science and policy in solving water problems. (Same course as Hydrologic Science 10.) GE credit: SciEng or SocSci, Wrt.—III. (III.) Fogg

11. California Geography (3)
Lecture—2 hours; discussion—1 hour; term paper. Introduction to cultural/societal patterns of California and their relationship to natural resources, biomes, geomorphology, and physiography. Focus on diversity of California's environments and their impacts on and alterations by human activities. Environmental issues in the State. GE credit: SciEng, SocSci, Wrt.—I. (I.) Richards

12. Plants and Society (4)
Lecture—3 hours; extensive writing—3 hours. Prerequisite: high school biology. Dependence of human societies on plant and plant products. Plants as resources for food, fiber, health, enjoyment and environmental services. Sustainable uses of plants for food production, raw materials, bioenergy, and environmental conservation. Global population growth and future food supplies. Not open for credit to students who have complete Plant Biology 12. (Former course Plant Biology 12.) (Same course as Plant Sciences 12.) GE Credit: Div, SciEng or SocSci, Wrt.—I, II, III. (I, II, III.) Fischer, Jasieniuk, Nevins, Tian

15. AIDS and Society (4)
Lecture—3 hours; discussion—1 hour. Biology of HIV transmission and AIDS and how a biological agent acts on and influences the structure of contemporary society. Includes the psychology of risk and stigma, gender issues, changes in social relationships and public policy, global implications. GE credit: SciEng or SocSci, Div, Wrt.—III. (III.) Radke

18. GIS and Society (3)
Lecture—2 hours; Laboratory—3 hours; term paper or discussion—0.3 hours. Geographic Information Systems (GIS) as a spatial technology and a tool for change in society. Evaluate physical, biological and social impact of GIS in the context of case studies such as land, water and community planning. GE Credit: SciEng or SocSci, Wrt.—III. (III.) Wallender

20. Genetics and Society (4)
Lecture—3 hours; discussion—1 hour. Not open for credit to students who have completed course 140. Basic concepts of genetics, modern methods of biotechnology, the process of scientific discovery and the public perception of the process; present and future impact of genetics on society. GE credit: SciEng or SocSci, Wrt.—I, II. (I, II.) Coaker, Cook, Epstein, Ronald

25. Global Climate Change: Convergence of Biological, Geophysical, & Social Sciences (3)
Lecture—2 hours; discussion—1 hour. Causes of global climate change and the biological, geophysical, and social consequences of such change. Methods used by different scientists for predicting future events. Complexity of global affairs. Decision making under uncertainty. GE Credit: Div, SciEng or SocSci, Wrt.—II. (II.) Bloom

30. Mushrooms, Molds, and Society (3)
Lecture/discussion—3 hours. Fungi as organisms with which humans interact daily, societal issues arising from these interactions. Fungi in medicine, religion, agriculture, and industry, as well as cultural perceptions of fungi. GE credit: SciEng or SocSci, Wrt.—I, II. (I, II.) Gilchrist, Gordon, Rizzo

40. Photography: Bridging Art and Science (3)
Lecture/discussion—2 hours; studio—3 hours. Photography is used to explore the common ground between art and science. Photographic processes, creativity and aesthetics, chaos and order, principles of space, time and light. Photographic interpretation and documentation of the natural world. GE Credit: ArtHum or SciEng or SocSci, Div, Wrt.—III. (III.) Nathan

42. Earth, Water, Science, Song (3)
Lecture—2 hours; studio—3 hours. Fusion of water and soil science with performing arts. Creative communication of scientific concepts and facts through exercises in song writing and poetry. Design, discuss and conduct public performances related to the functioning of the natural world. GE Credit: ArtHum or SciEng.—II. (II.) Silk

70A. Genetic Engineering in Medicine, Agriculture, and Law (5)
Lecture—5 hours. Historical and scientific study of the impact of genetic engineering in medicine, agriculture, and law, including examination of social, ethical, and legal issues raised. Offered in a distance-learning format. Not open to students who have taken Biological Sciences 1A, Biological Sciences 2A or equivalent, or course 20. Concurrent enrollment in a two unit seminar course, Plant Biology 98, is required. GE Credit: SciEng or SocSci.—II. (II.) Harada

90A. Issues in Environmental and Resource Sciences (2)
Seminar—2 hours; two Saturday field trips. Prerequisite: limited to lower division students. Discussion of historical and current issues in environmental and resource sciences. Lectures, reading and field trips will provide background for selected topics.—I, II. (I, II.)

90B. Observing and Writing in Biology (2)
Seminar—1 hour; laboratory—1 hour; term paper. Students will observe the interactions between microscopic organisms, conduct simple laboratory experiments, describe and analyze observations and discuss scientific observations and writing.

90C. Herbal Medicine: Relevance for the 21st Century (2)
Seminar—2 hours. Medicinal usage of plants from biological, historical, and cultural perspectives. Broad contexts of holistic and scientific paradigms for understanding herbal medicine. Saturday field trip to teach herb identification.—II. (II.)

90D. Saving Endangered Plant Species: Problems and Prospects (2)
Seminar—2 hours. Endangered plant species illustrate the value of conservation biology. Topics include societal issues and plant germplasm conservation, comparisons to animal conservation issues, and the economics of and justification for preserving endangered plants.—I. (I.) Parfitt

90E. Biotechnology—a New Era, a New Struggle (2)
Seminar—2 hours. Animal biotechnology and its applications. Discussion topics include potential societal impacts of various technologies, factors shaping public opinion, and ethical and moral questions arising from new biotechnology applications.—I. (I.) Murray

90F. Food Distribution in a Hungry World (2)
Seminar—2 hours. The biological, technological, environmental, and socioeconomic factors related to food distribution systems at local, regional, national, and international levels. The potential for increasing world food supply by reducing losses between harvest and consumption.—I. (I.)

90G. Science, Society and the Environment (2)
Seminar—2 hours. Contemporary environmental issues, scientific approaches to addressing these issues, and accompanying societal and ethical considerations.—I. (I.) Wilson

90X. Lower Division Seminar (1-4)
Seminar—1-4 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in Science and Society through shared readings, discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. May be repeated for credit. Limited enrollment.—I, II, III. (I, II, III.)

91A. Explorations in Science and Society: Cultures and Identities (2)
Seminar—1 hour; extensive writing or discussion—1 hour. Prerequisite: participation in the summer Special Transitional Enrichment Program (STEP) or consent of instructor; course 1 concurrently. Exploration of linkages among identity and culture, multi-disciplinary inquiry, and agricultural and environmental science issues.—I. (I.)

91B. Explorations in Science and Society: Leadership and Collaboration (2)
Seminar—1 hour; extensive writing or discussion—1 hour. Prerequisite: course 91A or consent of instructor. Extends understanding of culture and identity to issues of leadership, collaboration, and social action in science and society. Includes a mandatory two and half day retreat.—II. (II.)

91C. Explorations in Science and Society: Engagement (2)
Seminar—1 hour; internship—3 hours. Prerequisite: course 91B or consent of instructor. Explorations of the concept of engagement in science and society from philosophical and practical perspectives. Exploration of the concept of engagement based on lectures, self reflection, discussions and three hours of K-12 school internships per week.—III. (III.)

92. Internship in Science and Society (1-12)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Supervised internship on and off campus, in the community, or in institutional settings. (P/NP grading only.)

97T. Tutoring in Science and Society (2-3)
Discussion/lecture—6-9 hours. Prerequisite: lower division standing; completion of course being tutored; consent of instructor. Tutoring in undergraduate Science and Society courses. Assisting with leading discussion groups under supervision of instructor(s) and teaching assistants. Acting as liaison between the students and course instructor(s) to foster effective communication and interaction. May not be repeated. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Discussion—3-15 hours. Prerequisite: lower division standing and consent of instructor. (P/NP grading only.)

Upper Division Courses

120. Science and Contemporary Societal Issues (3)
Lecture/discussion—3 hours. Prerequisite: upper division standing. Study of a contemporary societal issue/problem emphasizing critical thinking with information drawn from several disciplines. Multiple instructors illustrate the necessity of an interdisciplinary and cooperative approach in solving important issues. Topic will vary. May be repeated one time for credit. Course not offered every year. GE credit: SciEng or SocSci, Wrt.—III. (III.)

130. Contemporary Leadership (4)
Lecture—3 hours; seminar—1 hour. Prerequisite: consent of instructor. Leadership, including issues, skills, and practices as they relate to individuals, organizations, diverse social settings and communities. Written and verbal communications, personality styles for collaborative work, and ethics. Limited enrollment.—II, III. (II, III.) King

135S. Biodiversity and Society in South Africa (4)
Lecture/discussion—3 hours; term paper or discussion—2 hours; fieldwork—2 hours. Prerequisite: acceptance into the Quarter Abroad Program "Biodiversity & Conservation in South Africa" and attendance in South Africa. Biodiversity in social context of South Africa; race, politics and conservation; use of indigenous plants and animals; weeds; water issues; ecotourism. Weekend and other field trips. Not offered every year. GE credit: Div, SciEng or SocSci, Wrt.—II. Cranston, Gullan

140. Genetics and Social Issues (4)
Lecture/discussion—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C. Social issues arising from the development and use of modern methods of biotechnology. Presentation, evaluation, and critical discussions of the present and future impact of genetics on society. Not open for credit to students who have completed course 20. GE credit: SocSci, Wrt.—II. (II.) Epstein

190X. Science & Society Seminar (1-4)
Seminar—1-4 hours. Prerequisite: upper division standing and consent of instructor. In-depth examination at an upper division level of a special topic in Science and Society. Emphasis upon student participation in learning. Emphasis upon student participation in learning. May be repeated for credit. Limited enrollment. (P/NP grading only.)—I, II, III. (I, II, III.)

192. Internship in Science and Society (1-12)
Internship—3-36 hours. Prerequisite: upper division standing and consent of instructor. Supervised internship on or off campus, in the community, or in institutional settings. (P/NP grading only.)

197T. Tutoring in Science and Society (1-5)
Tutoring—3-15 hours. Prerequisite: upper division standing; completion of course being tutored or the equivalent. Tutoring of students in Science and Society courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another Science and Society course. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study in Science and Society (1-5)
Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

Graduate Courses

298. Group Study (1-5)
Prerequisite: consent of instructor. May be repeated for credit when topic differs. (S/U grading only.)

299. Graduate Research (1-12)
Prerequisite: graduate student and consent of instructor. May be repeated for credit. (S/U grading only.)

Professional Course

390. Teaching Methods in Science and Society (1)
Discussion—1 hour. Prerequisite: graduate level and consent of instructor. Practical experience in methods and problems related to teaching Science and Society courses. Discussion of critical pedagogies specific to teaching of science-societal issues, preparing for and conducting discussion sessions, analyses of texts and supporting material, formulation of assignments, exams. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Science and Technology Studies

(College of Letters and Science)

Joseph Dumit, Ph.D., Program Director

Program Office. 1240 Social Sciences and Humanities Building
(530) 752-0703; *http://sts.ucdavis.edu*

Committee in Charge

Thomas Beamish, Ph.D. *(Sociology)*
Patrick Carroll, Ph.D. *(Sociology)*
Timothy Choy, Ph.D. *(Anthropology, Science and Technology Studies)*
Carolyn de la Pena, Ph.D. *(American Studies)*
Joseph Dumit, Ph.D. *(Anthropology, Science and Technology Studies)*
James Griesemer, Ph.D. *(Philosophy)*
Caren Kaplan, Ph.D. *(Women and Gender Studies)*
Roberta Millstein, Ph.D. *(Philosophy)*
Colin Milburn, Ph.D. *(English)*
Daniel Stolzenberg, Ph.D. *(History)*
Madhavi Sunder, J.D. *(School of Law)*

The Major Program

The Science and Technology Studies (STS) major is designed to facilitate the analysis and synthesis of science, technology, and medicine in a way that actively creates connections between the varieties of perspectives and concerns in the humanities and the sciences. The STS major takes science, technology, medicine, and their social, political, economic, and cultural contexts as its objects of study. As such, the STS major draws on the research programs of faculty in a wide range of departments, including American Studies, Anthropology, Economics, Environmental Science and Policy, History, Philosophy, Political Science, Science and Technology Studies, and Sociology. Students in STS pursue a broader understanding of science than is available within traditional science majors and is also suitable for students in the social sciences interested in interpreting science, technology and medicine as part of society and culture.

The Program. Graduation with a degree in Science and Technology Studies requires completion of introductory courses in the social sciences and humanities, in the natural sciences, and introductory, laboratory and seminar courses in STS. Upper division work includes twelve units from each of two different, complementing areas of concentration ("modules") and twelve units (plus prerequisites) providing depth, concentration and field work opportunities in the sciences. The modules are: *(1)* Cultural Studies of Science and Technology; *(2)* Ethics, Values, and Science Policy; *(3)* History and Philosophy of Science; IV. Medicine, Society, and Culture. Courses in the modules require careful selection to make the best use of the STS major. Prerequisites for courses in the sciences can be extensive and require substantial advance planning for timely completion. Students are encouraged to take advantage of faculty and staff advising to plan their course of study.

Career Alternatives. The STS major will create an opportunity to analyze science and allied practices from historical, philosophical, sociological, political, anthropological, and cultural perspectives. STS prepares students for careers that must address the broader social, cultural and political ramifications of science, technology and medicine such as law, journalism, public policy, economics, government, and science education. Careers that students of STS from many universities nationwide have pursued, in addition to academic careers in STS, include employment in: systems engineering, website design, science museums, non-profit health organizations, government service, libraries, law, medicine, veterinary medicine, dentistry, nursing, teaching, public health administration, media companies, management consultant practice, and the Peace Corps.

A.B. Major Requirements

UNITS

Preparatory Subject Matter.....16
- Science and Technology Studies 1 4
- Science and Technology Studies 20 4
- Eight units selected from American Studies 1A; Environmental Studies 1; Nature and Culture 1; Philosophy 30, 31, 32; Science and Society 1, 2, 3, 5..... 8

Depth Subject Matter 44-46
- Twelve units each from two of the following four modules: 24
  - *(1) Cultural Studies of Science and Technology:* Community and Regional Development 118, 162; History 139A, 139B; Nature and Culture 100, 180: Science and Technology Studies 130A, 131, 150; Sociology 176..... 12
  - *(2) Ethics, Values, and Science Policy:* Agricultural and Resource Economics 120, 147; Environmental Science and Policy 165; History 185B; Nature and Culture 120; Philosophy 115, 116; Physics 137, 160; Plant Pathology 140; Political Science 171, 175; Veterinary Medicine 170 ... 12
  - *(3) History and Philosophy of Science:* History 135A, 135B, 136, 185A, 185B; Philosophy 104, 108, 109; Science and Technology Studies 130A, 130B, 131 12
  - *(4) Medicine, Society, and Culture:* Epidemiology and Preventive Medicine 101, 160; History 139A, 139B; Psychology 160; Sociology 154..... 12
  - Note: Although a course may be listed in more than one module, that course may satisfy only one requirement.
- Science and Technology Studies 180 4
- Science and Technology Studies 190, or 190HA-HB 4-6
- *Science Electives:* Select twelve units, at least eight of which must be from upper division courses, from the Approved Science Electives list below. (Unit totals will vary with required prerequisites.).....12-32
- Note: Students are strongly advised to choose science elective courses in consultation with faculty advisors. Some courses in some areas may require prerequisites too extensive to be used for the STS major.

Total Units for the Major 60-82

Approved Science Electives. Courses may be drawn from any of the following approved subject areas: Aeronautical Science and Engineering; Animal Genetics; Animal Science; Anthropology; Applied Behavioral Sciences; Applied Biological Systems Technology; Atmospheric Science; Avian Sciences; Biological Chemistry; Biological Sciences; Cell Biology and Human Anatomy; Chemistry; Engineering; Engineering: Applied Science; Engineering: Biological Systems; Engineering: Chemical; Engineering: Civil and Environmental; Engineering: Computer Science; Engineering: Electrical and Computer; Engineering: Mechanical; Entomology; Environmental and Resource Sciences; Environmental Horticulture; Environmental Science and Policy; Environmental Toxicology; Evolution and Ecology; Exercise Science; Fiber and Polymer Science; Food Science and Technology; Geology; Hydrologic Science; Material Science and Engineering; Medical Microbiology; Medical Pharmacology and Toxicology; Microbiology; Molecular and Cellular Biology; Nematology; Neurobiology, Physiology, and Behavior; Nutrition; Pathology, Microbiology, and Immunology; Physics; Plant Biology; Plant Pathology; Population Health and Reproduction; Psychology; Soil Science; Wildlife, Fish, and Conservation Biology.

Major Adviser. J. Dumit

Courses in Science and Technology Studies (STS)

Lower Division Courses

1. Introduction to Science, Technology and Medicine Studies (4)
Lecture—3 hours; discussion—1 hour. History, philosophy, sociology, politics, and cultural studies of science, technology, and medicine. Emphasis on a broad range of perspectives. GE credit: SciEng or SocSci.—Carroll

20. Methods in Science, Technology and Medicine Studies (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 recommended. Methodological issues concerning the historical, philosophical, sociological, ethical, and political analysis of science, technology, and medicine. Detailed case studies to illustrate different methods of analysis. GE credit: SciEng or SocSci, Wrt.—Carroll

32. Drugs, Science and Culture (4)
Lecture—3 hours; discussion—1 hour. Drugs, politics, science, society in a cultural perspective: emphasis on roles of science, government and the media in shifting attitudes toward alcohol, marijuana, Prozac and other pharmaceuticals; drug laws, war on drugs and global trade in sugar, opium, cocaine. (Same course as Anthropology 32.) GE Credit: Div, SocSci, Wrt.—I. (I.) Dumit

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off and on campus in all subject areas offered in the program in Science & Technology Studies under the supervision of a member of the faculty. May be repeated up to 12 units for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor (P/NP grading only.)

Upper Division Courses

109. Visualization in Science (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 1 or 20 or Anthropology 2. Anthropological approaches to scientific visualization techniques, informatics, simulations. Examination of different visualization techniques toward understanding the work involved in producing them,

critical assessment of their power and limits, especially when visualizations are used socially to make claims. Offered in alternate years. (Same course as Anthropology 109.) GE credit: SocSci, Wrt.—II. Dumit

120. Religion, Magic and Science (4)
Lecture—3 hours; extensive writing. Religion, magic, and science from the middle ages to the present. Contrast between modern scientific methodology and religious and magical thinking. (Same course as Religious Studies 120.) Offered in alternate years. GE credit: ArtHum, Div, Wrt.—Coudert

129. Health and Medicine in a Global Context (4)
Lecture/discussion—4 hours; term paper. Prerequisite: course 1 or Anthropology 2. Recent works in medical anthropology and the science studies of medicine dealing with global health issues such as AIDS, pandemics, clinical trials, cultural differences in illnesses, diabetes, organ trafficking, medical technology and delivery, illness narratives, and others. (Same course as Anthropology 129.) GE credit: Div, SocSci, Wrt.—II. (II.) Dumit

130A. From Natural History to the History of Nature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: History 135A recommended. Evolution and demise of natural history as a discipline from Aristotle to Linnaeus. Considers ancient views of nature and its Renaissance rediscovery; the emergence of biology, botany, geology, and zoology; the history of taxonomy and classification. GE credit: ArtHum or SciEng, Wrt.

130B. History of Modern Biology (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 130A recommended. Development of modern biology from pre-Darwinian roots to the present. Considers emergence of modern biological specialities and consolidation of biological theory around evolutionary ideas. History of allied fields such as genetics, paleontology, embryology, ecology, systematics and molecular biology. GE credit: ArtHum or SciEng, Wrt.

131. Darwin (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Students will explore the life and times of Charles Darwin and will trace the development of evolutionary thinking before and after the *Origin of Species* to appreciate its place in Victorian society and in the corpus of Darwin's thought. GE credit: ArtHum or SciEng, Wrt.—Griesemer

150. Gender and Science (4)
Lecture/discussion—3 hours; term paper. An interdisciplinary approach to the relations between gender and science. Topics include the biological and cultural construction of sexual difference, the role of women as practitioners of science, and feminist approaches to science. GE credit: SocSci, Div, Wrt.

161. Time: Mechanism and Measurement (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1. Cultural concepts of time; units and instruments of time measurement; historical differences in the social organization of time; and time measurement in twentieth-century science. GE credit: SocSci, Wrt.

163. History of Communication Technologies (4)
Lecture/discussion—3 hours; term paper. History of communication technologies from the late Middle Ages to the 20th century. Questions of technology, knowledge, power and culture. Particular attention to questions about information and truth. Offered in alternate years. GE credit: SocSci.

164. Writing Science (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3, or equivalent. Texts and writing practices in the production of scientific knowledge. Surveys the literary structure of scientific arguments; history of scientific genres; rhetoric and semiotics in scientific culture; graphical systems in the experimental laboratory; narratives of science, including science fiction. (Same course as English 164.) GE Credit: Wrt.—I. Milburn

165. Built Environments (4)
Lecture—3 hours; extensive writing. Built environments, which are designed to support forms of life. Their role as carriers of cultural memory and in turning knowledge of nature into social assets. Historical constellations of knowledge, social order, and power. Offered in alternate years. GE credit: SocSci, Wrt.

173. Science Fiction (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 3 or Science and Technology Studies 1, or equivalent. The literary modes and methods of science fiction. Representative texts, authors, and themes of the genre—e.g., time travel, alternative universes, and utopias. Relations of science fiction to science, philosophy, and culture. (Same course as English 173.) GE credit: ArtHum, Wrt.

175. Laboratory Studies Lab (4)
Lecture/discussion—4 hours. Prerequisite: upper division standing or consent of instructor. Hands-on training in STS fieldwork, interviewing, archival research and data analysis. Review of laboratory studies literature, informed consent procedures, ethics, and care of the data. Individual and group projects possible.—III. (III.)

176. Sociology of Knowledge, Science, and Scientific Knowledge (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: upper division standing preferred. Social, cultural, and historical dimensions of knowledge, especially scientific knowledge. Problems, methods, and theory in sociology of scientific knowledge. Laboratory and historical case studies. Scientific and technical knowledge in institutional and organizational contexts. (Same course as Sociology 176.)—Carroll

180. Topics in History and Philosophy of Science (4)
Seminar—3 hours; term paper. Prerequisite: course in History and Philosophy of Science or other coursework relevant to topic. In depth treatment of selected topics in the history and philosophy of science. Possible topics include history of modern physics, history of molecular biology, science and society, science and power, scientific explanation, technology and culture, theory testing. May be repeated for credit with consent of instructor.

190. Seminar in Science, Technology and Medicine Studies (4)
Lecture/discussion—3 hours; term paper. Prerequisite: open to junior and senior Science and Technology Studies majors only. Intensive reading, discussion, research and writing by small groups in selected topics of science, technology, and medicine studies scholarship. Emphasis on individual research projects.

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off and on campus in all subject areas offered in the program in Science & Technology Studies under the supervision of a member of the faculty. May be repeated three times for up to 12 units for credit. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

250. History and Philosophy of Science (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Interdisciplinary seminar in the history and philosophy of science. Focuses on issues such as historiography, methodology, and the conceptual foundations of science. May be repeated for credit with consent of instructor.

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Sexuality Studies

(College of Letters and Science)

http://wms.ucdavis.edu/wgssite/sexualitystudies/

The interdisciplinary minor in Sexuality Studies offers students a unique opportunity to study the human-made aspects of sexual identities, desires, and practices, which differ across cultures and historical moments, and are not reducible to biology or anatomy. The minor in Sexuality Studies core and elective courses have sexuality at their center. Additional courses invite students to integrate their study of sexuality with issues of gender; race and ethnicity; class; politics and activism; literature and popular culture; law; and other domains.

The minor is sponsored by the Program in Women and Gender Studies.

Minor Program Requirements:

UNITS

Sexuality Studies 18-20

Two Elective courses from Field A:

Women and Gender Studies 170 4

Two Elective courses from the following:

Anthropology 139 BN, English 186, Epidemiology and Preventative Medicine 163, History 184, Human Development 12, Psychology 158, Science and Society 15, Women and Gender Studies 70 7-8

Two Elective courses from Field B (below) or seminars/individual study by petition to achieve a total of 18-20 units:

American Studies 115, Asian American Studies 112, Chicana/o Studies 160, English 166, German 145, History 132, Political Science 152, Sociology 120, Women and Gender Studies 140, Women and Gender Studies 179 7-8

Restrictions.

(a) Students may take no more than one lower division course to satisfy requirements for the minor.

(b) To satisfy the interdisciplinary component of the minor, students must either split their coursework roughly equally between two programs/departments or take coursework in at least three programs/departments.

(c) Students may petition the minor adviser to accept Special Topics courses and Capstone/Senior Seminars as additional courses, as long as their course of study follows the minor's lower-division restriction and interdisciplinary requirements.

(d) Students may petition the minor adviser to accept up to four units of registered individual study, group study or internship towards the minor program, as long as their course of study follows the minor's lower-division restriction and interdisciplinary requirements.

Advising. Program in Women and Gender Studies, 2222 Hart Hall (530) 752-4686

Social and Ethnic Relations

(College of Letters and Science)

The interdisciplinary minor in Social and Ethnic Relations explores the racial, ethnic, class and gender aspects of human relations in the modern world. Students study human societies and cultures from a multi-ethnic perspective and across established academic departmental lines. The minor is jointly sponsored by African American and African Studies, Asian American Studies, Native American Studies, and Women and Gender Studies.

Minor Program Requirements:

UNITS

Social and Ethnic Relations 24

Select one course from each of the following six groups to total 24 units.

(a) African American and African Studies 100; Anthropology/Native American Studies 134; Women's Studies 102

(b) African American and African Studies 123, 133, 145A

(c) Asian American Studies 1, 2, 100, 110, 130

(d) Chicana/o Studies 130, 132

(e) Native American Studies 1, 10, 115, 119, 130A, 130B, 130C, 157, 180

(f) Women's Studies 103, 104, 180

Restrictions. *(a)* Courses applied toward the satisfaction of a major may not also be offered in satisfaction of the minor. *(b)* No more than four units (one course) may be lower division.

Advising. Contact the Department of Native American Studies in 2401 Hart Hall (530) 752-3237.

Social Sciences

(College of Letters and Science)

Marianne Page, Ph.D., Program Director

Program Office. 108 Sproul Hall
(530) 752-4001

Committee in Charge

Michael Kurleander, Ph.D. *(School of Education)*
Dina Okamoto, Ph.D. *(Sociology)*
Marianne Page, Ph.D. *(Economics)*
Heather Rose, Ph.D. *(School of Education)*
Kimberlee Shauman, Ph.D. *(Sociology)*
Ann Stevens, Ph.D. *(Economics)*

Emeriti Faculty

Nigel Allan, Ph.D. Professor Emeritus
Dennis J. Dingemans, Ph.D., Senior Lecturer Emeritus
Howard F. Gregor, Ph.D., Professor Emeritus
Frederick J. Simoons, Ph.D., Professor Emeritus
Kenneth Thompson, Ph.D., Professor Emeritus

The Program of Study

The Program in Social Sciences promotes the development of innovative curricular initiatives across the social sciences, including offering broadly conceived, integrative undergraduate-level and graduate-level courses. Faculty affiliated with the program are often engaged in interdepartmental teaching and research.

Social Theory and Comparative History

(College of Letters and Science)

Eric Rauchway, Ph.D., Program Director and Professor *(History)*

Program Office. Center for History, Society, and Culture, 5211 Social Sciences and Humanities Building (530) 752-3046

Committee in Charge

Carolyn de la Pena, Ph.D., Associate Professor *(American Studies)*
Alan Olmsted, Ph.D., Professor *(Economics)*
Eric Rauchway, Ph.D., Professor *(History)*
Academic Senate Distinguished Teaching Award
John T. Scott, Ph.D., Professor *(Political Science)*
Kimberlee Shaumann, Ph.D., Associate Professor *(Sociology)*
Alan M. Taylor, Ph.D., Professor *(Economics)*
Li Zhang, Ph.D., Professor *(Anthropology)*

Graduate Study. The program comprises course work and research leading to the Ph.D. with a designated emphasis in Social Theory and Comparative History. The program provides theoretical training and interdisciplinary perspective to Ph.D. candidates in the nine participating departments and graduate groups (Anthropology, Comparative Literature, Cultural Studies, Economics, English, Geography, History, Political Science, and Sociology). Students from other departments are also welcome. All students must fulfill all Ph.D. requirements of their home department. The additional requirements leading to the designated emphasis include: *(1)* four graduate courses (Social Theory and Comparative History 250, Sociology 242A, and two courses sponsored by the Social Theory and Comparative History program, one of which must be offered by a department other than the student's home department); *(2)* presentation of a Social Theory and Comparative History field as one area of specialization in the departmental Ph.D. qualifying examination; *(3)* an oral discussion, following passage of the Ph.D. qualifying examination, based on the student's dissertation prospectus; *(4)* completion of the dissertation to the satisfaction of the student's thesis committee, one of whose members will be a representative of the Social Theory and Comparative History program.

Graduate Adviser. Consult the Program Director, Program office, or see *http://chsc.ucdavis.edu* for advising and detailed information on application and requirements.

Courses in Social Theory and Comparative History (STH)

Graduate Courses

250. Research in Social Theory and Comparative History (4)
Seminar—3 hours; term paper. Prerequisite: admission to Social Theory and Comparative History Designated Emphasis. Theoretically informed research in comparative history. Students read exemplary works and learn to frame their own research projects. Presentations include Center for History, Society, and Culture faculty and visitors discussing current research.—III. (III.)

290. Advanced Topics in Social Theory and Comparative History (4)
Seminar—3 hours; term paper. Prerequisite: consent of instructor and History 204 or Sociology 242A. Interdisciplinary study of particular substantive problems in social theory and comparative history. Topics vary.—I, II, III. (I, II, III.)

295. Advanced Group Research in Social Theory and Comparative History (1)
Discussion—1 hour. Prerequisite: consent of instructor. Participation in research workshops sponsored by the Center for Comparative Research for History, Society, and Culture. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

296. Theory and Society Journal Editorial Workshop (1-4)
Workshop—1 hour; independent study—3 hours. Reading and offering workshop critiques of papers submitted for publication. Reading and discussion of other relevant work in history and the social sciences. May be repeated for credit up to 36 units or with consent of instructor. (S/U grading only.)—I, II, III. (I, II, III.) Gouldner

Sociology

(College of Letters and Science)

Vicki Smith, Ph.D., Chairperson of the Department

Department Office. 1282 Social Sciences and Humanities Building
(530) 752-0782; *http://sociology.ucdavis.edu*

Faculty

Thomas D. Beamish, Ph.D., Associate Professor
Fred Block, Ph.D., Professor
Patrick Carroll, Ph.D., Associate Professor
Lawrence E. Cohen, Ph.D., Professor
Natalia Deeb-Sossa, Ph.D., Assistant Professor
Robert Faris, Ph.D., Assistant Professor
Diane H. Felmlee, Ph.D., Professor
T. Ryken Grattet, Ph.D., Associate Professor
Laura Grindstaff, Ph.D., Associate Professor
Eric Grodsky, Ph.D., Assistant Professor
Drew Halfmann, Ph.D., Assistant Professor
John R. Hall, Ph.D., Professor
Erin R. Hamilton, Ph. D., Assistant Professor
Bruce D. Haynes, Ph.D., Associate Professor
Mary Jackman, Ph.D., Professor
David J. Kyle, Ph.D., Associate Professor
Ming-Cheng Lo, Ph.D., Associate Professor
William McCarthy, Ph.D., Professor
Michael McQuarrie, Ph.D., Assistant Professor
Stephanie L. Mudge, Ph.D., Assistant Professor
Dina G. Okamoto, Ph.D., Associate Professor
Kimberlee A. Shauman, Ph.D., Associate Professor
Xiaoling Shu, Ph.D., Associate Professor
Vicki Smith, Ph.D., Professor
Eddy U, Ph.D., Assistant Professor
Diane L. Wolf, Ph.D., Professor

Emeriti Faculty

James C. Cramer, Ph.D., Professor Emeritus
Bruce M. Hackett, Ph.D., Professor Emeritus
Carole E. Joffe, Ph.D., Professor Emerita
Carl C. Jorgensen, Ph.D., Professor Emeritus
John F. Lofland, Ph.D., Professor Emeritus
Lyn H. Lofland, Ph.D., Research Professor and Professor Emerita
John T. Walton, Ph.D., Research Professor and Professor Emeritus

Affiliated Faculty

Lalia Kiburi, Ph.D., Lecturer
Debora Paterniti, Ph.D., Associate-Adjunct Professor
Ellen Robert, Ph.D., Lecturer

The Major Programs

Sociology is the study of human society in all its manifestations. Its aim is to discover the process and structure of human interaction, to identify the main forces that sustain or weaken social groups, and to determine the conditions that transform social life. Sociology, like any science, is a disciplined, intellectual quest for knowledge about the fundamental nature of things.

The Program. The Department of Sociology offers two major programs, Sociology and Sociology–Organizational Studies. Students selecting the Sociology major may choose from four options in the major. The General Sociology emphasis allows students to obtain a broad understanding of the concepts, methods, and theories of sociology. Students with a special interest in the areas of Law and Society or Social Services may choose a more specialized program of courses and practical experience within the sociology major. The Comparative Studies

and World Development emphasis provides a sociological perspective on social and economic changes throughout the world, with a stress on relationships between "developed" and "underdeveloped" societies. In their junior year, students are encouraged to consider the Education Abroad Program—especially one in a developing country.

The Sociology–Organizational Studies major develops a broad understanding of the political, social, and economic organizations that comprise modern society. This major emphasizes a sociological perspective, but incorporates a multidisciplinary field of study. The major introduces students to a range of theories and methods that social scientists use in the analysis of organizations.

Career Opportunities. In the Sociology major, the General option is for students desiring a solid liberal arts education as well as those interested in graduate work in the social sciences. Options in Law and Society or Social Service prepare students for careers in such areas as law, corrections, social work or counseling. The Comparative Studies and World Development emphasis prepares students for graduate training leading to careers in international fields. Majors in Sociology–Organizational Studies will be prepared for a variety of career options, particularly in the field of management. The major specifically meets entry requirements for programs of professional training leading to a Masters degree in public or private management, and may also lead to further study in any of the disciplinary areas incorporated in the major.

Sociology

A.B. Degree Requirements:

General emphasis:

UNITS

Preparatory Subject Matter 28-29

Sociology 1; 46A, and 46B 13
Sociology 2, 3, 4, 5, 11, 30A, or 30B 3-4
Anthropology 2 or 20 4
Select from History 4A, 4B, 4C, 6, 7A, 7B, 7C, 8, 9A, 9B, 10C, 15, 17A, 17B 4
Select from Philosophy 5, 14, 24 4

Depth Subject Matter 44

(A) Sociology 100 4
(B) Select one course from each of the following four categories:
Individual, Culture and Society: Sociology 125, 126, 135 4
Stratification and Social Differentiation: Sociology 130, 132, 140 4
Organizations and Institutions: Sociology 118, 131, 146, 180A 4
Social Dynamics: Sociology 104, 141, 143A, 170 4
(C) Select three upper division courses from one of the following clusters, not counting courses taken to fulfill requirement B 12
(1) Individual, Culture and Society: Sociology 102, 120, 122, 125, 126, 127, 128, 129, 131, 132, 134, 135, 137, 143B, 148, 150, 152, 153, 172, 173, 174, 175, 176
(2) Stratification and Social Differentiation: Sociology 118, 128, 129, 130, 132, 133, 134, 140, 145A, 145B, 171, 172, 185, 188, and not more than one of the following courses: African American and African Studies 123; Asian American Studies 100; Chicana/o Studies 110; or Native American Studies 115
(3) Organizations and Institutions: Sociology 118, 124, 131, 133, 139, 144, 146, 149, 150, 151, 154, 155, 159, 160, 180A, 180B, 181, 182, 183, 185
(4) Social Dynamics: Sociology 104, 123, 125, 138, 141, 143A, 145A, 145B, 147, 148, 156, 157, 158, 170
(5) Student-Initiated Thematic Cluster: developed with a faculty adviser and approved by the Sociology Undergraduate Curriculum Committee
(D) Eight units of Sociology beyond courses taken to fulfill above requirements, and outside of the course cluster used to fulfill requirement C 8
(E) One integrative course (prerequisite: senior standing and completion of requirement for Preparatory Subject Matter, Depth Subject Matter, requirement A, and at least two of the courses for requirement B). Choose from Sociology 190X, 191, 192/193, 194HA-194HB, 195 4

Total Units for the Major 72-73

Law and Society emphasis:

UNITS

Preparatory Subject Matter 29

Sociology 1; 3, 4, or 11; 46A and 46B 17
Anthropology 2 or 20 4
Select from History 4A, 4B, 4C, 6, 7A, 7B, 7C, 8, 9A, 9B, 10C, 15, 17A, 17B ... 4
Philosophy 5 or 14 4

Depth Subject Matter 44

Sociology 100 and 155 8
Select courses from the following categories:
Individual Culture and Society: Sociology 125, 126, 135 4
Stratification and Social Differentiation: Sociology 130, 132, 140 4
Organizations and Institutions: Sociology 118, 131, 146, 160, 180A 4
Crime and Social Dynamics: Sociology 120, 150, 151, 152, 171 12
Stratifications and Social Dynamics: Sociology 118, 137, 148, 156, 157, 158; African American and African Studies 123, 145A, 145B; Chicana/o Studies 130, 132; Native American Studies 117, 118 4
Legal Studies: Asian American Studies 155; English 107; Environmental Science and Policy 161; Environmental Toxicology 138; Hydrology 150; Philosophy 119; Political Science 122, 151, 152, 154; Psychology 153; Women's Studies 140 4
Methodology: Prerequisite: senior standing and completion of requirement for preparatory subject matter; select one course from Sociology 190X, 192/193, 194HA-194HB, 195 4

Total Units for the Major 73

Social Services emphasis:

Preparatory Subject Matter 26-28

Sociology 2; 3; 46A and 46B 16
Psychology 1 4
Select from African American and African Studies 10, 15; Asian American Studies 1, 2; Chicana/o Studies 10, 50; Native American Studies 1, 10; Sociology 4, 11, 30A, or 30B 6-8

Depth Subject Matter 44

Sociology 131, 140, 185 12
Psychology 140, 142, 151, or 168 4
Select courses from the following categories:
Social Issues: Sociology 104, 120, 122, 124, 139, 143A, 144, 146, 149, 150, 152, 153, 154, 155, 156, 158, 160, 170, 171 4
Social Interaction: Sociology 126, 127, 128, 143B, 148, 157 4
Race and Ethnicity: African American and African Studies 100; Asian American Studies 110, 111, 150; Chicana/o Studies 110; Community and Regional Development 176; Native American Studies 115; Sociology 129, 130, 134, 137, 172 4
Gender: Sociology 132, 133, 145B, 172 4
Organizational Behavior: Sociology 139, 146, 151, 154, 159, 180A, 180B, 181, 182, 183 4
Methodology: Prerequisite—senior standing and completion of requirement for preparatory subject matter: Sociology 103, 106 (or the equivalents), 190X, 192/193, 194HA-194HB, 195 4

Total Units for the Major 70-72

Comparative Studies and World Development emphasis:

Preparatory Subject Matter 29-59

Sociology 1; 5; 46A and 46B 17
Economics 1B 4
Anthropology 2 or 20 4
History 10C or Political Science 2 4
Course work in one modern foreign language at the two-year level or provide proof of proficiency 27-30

Depth Subject Matter 48

Sociology 100, 104, 141, 145A, 170 .. 20
Anthropology 126A, 126B, or Economics 115A 4
Anthropology 127; Sociology 118, 130, 131, 143A, 144, 145B, 156, 158 12
Regional focus, three courses from one of the following groups 12
(1) Africa: African American and African Studies 110, 111, 162; Anthropology 140A, 140B; History 115A, 115B, 115C, 116; Political Science 134, 149
(2) Latin America: African American and African Studies 107A, 180; Anthropology 144, 146; History 159, 161A, 161B, 162, 163A, 163B, 164, 165, 166A, 166B, 167, 168; Native American Studies 120, 133; Political Science 143; Sociology 158; Spanish 170, 172, 173
(3) Middle East: Anthropology 142; History 112A, 112B, 113, 190A, 190B, 190C, 193A, 193B; Jewish Studies (see an advisor); Middle Eastern Studies (see an advisor); Religious Studies 162; Women's Studies 184
(4) Asia-China & Japan: African American and African Studies 107C; Anthropology 148A, 148B, 148C, 149A, 149B; East Asian Studies 113; Economics 171; History 191 (series), 194A, 194B, 194C; Political Science 148A, 148B; Religious Studies 165, 170, 172; Sociology 147, 188
(5) Southeast Asia/Pacific: Anthropology 143A, 143B, 145, 147; Economics 171; History 191 (series), 195B, 196A, 196B; Political Science 148B, 148C; Religious Studies 165, 170, 172

Total Units for the Major 77-107

Sociology—Organizational Studies

A.B. Degree Requirements:

UNITS

Preparatory Subject Matter 29

Sociology 1; 2; 5 or 11; 46A and 46B 21
Economics 1A and 1B 8

Depth Subject Matter 44

Sociology 100 4
Sociology 180A 4
Sociology 106 (or its equivalent) 4
Select from Communication 134, 136, 172; Sociology 126 4
Select five courses from below, at least three courses from Sociology 20
Agricultural and Resource Economics 112, 130; American Studies 125; Community and Regional Development 151, 152, 154, 156, 158, 162, 164, 168; Economics 116, 121A, 121B, 151A, 151B; History

185B, 194D; Political Science 107, 180, 187; Sociology 103, 124, 138, 139, 141, 154, 159, 160, 180B, 181, 183, 185
Select from Sociology 128, 130, 132, 134, 140, 145A, 145B, 172..... 4
Methodology: Prerequisite: senior standing and completion of requirement for preparatory subject matter; select one course from Sociology 190X, 192/193, 194HA-194HB, 195 4

Total Units for the Major 73

Major Advisers. Consult the Departmental Advising office in 1282 Social Sciences and Humanities Building.

Minor Program Requirements:

UNITS

Sociology 20

Choose any five upper division courses in Sociology, except the following: SOC190X, 191, 192/193, 194HA, 194HB, 195, 197T, 198, 199

Minor Advisers. Consult the departmental Advising office in 1282 Social Sciences and Humanities Building.

Honors Program. An Honors Program is available to Sociology and Sociology-Organizational Studies majors who have demonstrated excellence in their field of study. To be eligible for the program, students must have a grade-point average of 3.500 in the major and the recommendation of a faculty sponsor familiar with their work. In addition to meeting the standard major requirements, students are encouraged to take a 199 course with their sponsor in the spring of their third year, prior to the seminar courses. The honors student writes an honors thesis and participates in a two-quarter honors seminar (course 194HA-194HB). Successful completion of the Honors Program, when combined with College GPA requirements, enables the student to graduate with Highest Honors or with High Honors. Applications for the program are due in August before the student begins their fourth year.

Honors Program Advisor. Drew Halfmann, *dhalfmann@ucdavis.edu*

Graduate Study. The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in sociology. Further information regarding graduate study may be obtained at the Department office or on our website.

Graduate students in Sociology have the opportunity to pursue designated emphases in Critical Theory, Social Theory and Comparative History, Native American Studies, Economy, Justice and Society, or Feminist Theory and Research. See these headings for further details on these interdisciplinary programs.

Graduate Advisers. Consult the Graduate Program Coordinator in 1287 Social Sciences and Humanities Building.

Courses in Sociology (SOC)

Lower Division Courses

1. Introduction to Sociology (5)
Lecture—4 hours; discussion—1 hour. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality. GE credit: SocSci.—I, II, III. (I, II, III.)

2. Self and Society (4)
Lecture—3 hours; discussion—1 hour. Principles and basic concepts of sociological social psychology. Includes the study of the character of the self, identity, roles, socialization, identity change, emotion and social interaction. GE credit: SocSci, Wrt.—I, II, III. (I, II, III.)

3. Social Problems (4)
Lecture—3 hours; discussion—1 hour. General sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement. GE credit: SocSci, Wrt.—I, II, III. (I, II, III.)

4. Immigration and Opportunity (4)
Lecture—3 hours; discussion—1 hour or term paper. Social and demographic analysis of immigration: motives and experiences of immigrants; immigration and social mobility; immigration, assimilation, and social change; multicultural societies. Detailed study of immigration into the U.S., with comparative studies of Europe, Australia, and other host countries. GE credit: SocSci, Div, Wrt.—I. (I.)

5. Global Social Change: An Introduction to Macrosociology (4)
Lecture—3 hours; discussion—1 hour. An introduction to change and diversity in world history, including the United States. Examines population and family, technological change and economic development, power and status, culture and identity. GE credit: SocSci, Div, Wrt.—III. (III.)

11. Sociology of Labor and Employment (4)
Lecture—3 hours; discussion—1 hour. Labor and employment issues in the contemporary United States with some use of historical and comparative materials. Topics will include strategies pursued by employers and employees, labor market discrimination and the role of social policies in shaping labor markets. GE Credit: SocSci, Wrt.—II. (II.)

25. Sociology of Popular Culture (4)
Lecture—3 hours; discussion—1 hour. Social mechanisms that shape modern popular culture. High, folk, and mass culture: historical emergence of popular culture. Mass media, commercialization, ideology and cultural styles. Theories and methods for analyzing cultural expressions in pop music, street art, film, television, and advertising. GE credit: SocSci, Wrt.—II, III. (II, III.)

30A. Intercultural Relations in Multicultural Societies (3)
Lecture—1.5 hours; discussion—1.5 hours. Macrostructural analysis of contemporary multicultural societies; immigration and assimilation in comparative perspective; social construction of racial and ethnic group identities; ethnicity and gender; group conflict and cooperation; controversies surrounding multiculturalism. First course in a two-course Multicultural Immersion Program. GE credit: SocSci, Div.—I. (I.)

30B. Intercultural Relations in Multicultural Societies (3)
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: course 30A or consent of instructor. Social-psychological analysis of personal experiences living in a multicultural society; conforming to or rejecting group identity or stereotypes; managing and reducing conflict; cross-cultural communication; promises and problems of diversity at UC Davis. Second course in a two-course Multicultural Immersion Program. GE credit: SocSci, Div.—II. (II.)

46A. Introduction to Social Research (4)
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Examination of the methodological problems of social research. Selection and definition of problems of investigation, data-gathering techniques, and sampling.—I, II, III. (I, II, III.)

46B. Introduction to Social Research (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association.—II, III. (II, III.)

90X. Lower Division Seminar (1-2)
Seminar—1-2 hours. Prerequisite: lower division standing and consent of instructor. Examination of a special topic in sociology through shared readings, discussions, written assignments, or special activities such as fieldwork, laboratory work, etc. May not be repeated for credit. Limited enrollment.

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. Primarily intended for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Origins of Modern Sociological Theory (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1; consent of instructor; restricted to upper division standing. The origins of modern sociological thought. Special emphasis on three major theorists from the classical tradition of nineteenth century European social thought: Karl Marx, Max Weber, and Emile Durkheim. GE credit: Wrt.—I, II, III. (I, II, III.)

102. Society and Culture of California (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: introductory course in Sociology recommended. California's distinctive society and culture; sociological analyses of topical issues concerning diversity, environment, cities.

103. Evaluation Research Methods (4)
Lecture—3 hours; discussion—1 hour or field research (instructor's option). Prerequisite: course 46A and 46B, or Statistics 13 or the equivalent. Surveys applications of research methods to the evaluation of social programs, primarily emphasizing methodological issues, e.g., research design and data collection; uses of evaluation research are also discussed and placed in theoretical context. Participation in an evaluation project.—III. (III.)

104. The Political Economy of International Migration (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: upper division standing. Analysis of worldwide migration patterns, and social scientific theories of international and transnational migration. Focus in economical, political, and social impact of immigration and potential for international and regional cooperation. (Same course as International Relations 104).—II. (II.)

106. Intermediate Social Statistics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 46B or Statistics 13 or the equivalent. Intermediate level course in statistical analysis of social data, emphasizing the logic and use of statistical measures, procedures, and mathematical models especially relevant to sociological analysis.—I, III. (I, III.)

118. Political Sociology (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Relation of social cleavages and social cohesion to the functioning of political institutions; the social bases of local and national power structures; social sources of political movement, analysis of concepts of alienation, revolution, ideology, ruling class, and elite.—I, II, III. (I, II, III.)

120. Deviance (4)
Lecture—3 hours; term paper or discussion. Social structural sources, institutional practices and microprocesses associated with illegality, evil, disease, immorality, disability, racial and class differences, citizenship, and the body. Special emphasis on expert knowledge and the production and management of social difference. GE credit: Wrt.—I, II. (I, II.)

122. Sociology of Adolescence (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Chronological age and social status; analysis of social processes bearing upon the socialization of children and adolescents. The emergence of "youth cultures." Generational succession as a cultural problem.—II. (II.)

123. American Society (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. The demographic and social structure of American society and population, with emphasis on ethnic and class groups as bases for political and economic interest. Attention to selected current social controversies.

124. Sociology of Education (4)
Lecture—3 hours; term paper or discussion—1 hour (instructor's option). Education and the social structure. Class size, curriculum, and economies of scale. Relations between families and schools in socialization; familial ascription and educational achievement. Education and industrialization. Organizational and occupational structure of schools. Discussion of selected controversies.—I. (I.)

125. Sociology of Culture (4)
Lecture/discussion—3 hours; term paper. Sociological approaches to study of historical and contemporary culture and mass media, and their structuring in relation to social actors, institutions, stratification, power, the production of culture, audiences, and the significance of culture in processes of change. GE credit: SocSci.—I, II. (I, II.)

126. Social Interaction (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 2. Everyday interaction in natural settings; ethnographic approaches to the understanding of social meanings, situations, personal identity and human relationships. Particular attention to the work of Erving Goffman and to principles of field observation and qualitative analysis. GE credit: Wrt.—I. (I.)

127. Sociology of Death (4)
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Overview of attitudes toward, structural effects of, and methods of coping with death and death-related behaviors. Particular attention to social psychological aspects of death and dying, to death occupations, and to death rituals in various cultures. GE credit: Wrt.

128. Interracial Interpersonal Dynamics (4)
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: one course from courses 1, 2, 3, Afro-American Studies 10, Asian American Studies 1, 2, Chicano Studies 10, Native American Studies 1, 20. Analysis of the influences of cultural differences and racial stratification on interpersonal interaction in instrumental settings (e.g., work, education, political action) and intimate settings (e.g., friendship, love, marriage, family). Minority/majority relationships. GE credit: Div, Wrt.—III. (III.)

129. Sociology of Black Experience in America (4)
Lecture—3 hours; discussion—1 hour or research or term paper (instructor's option). Survey of historical and contemporary theoretical sociological perspectives on the Black experience in United States. Emphasis on comparisons of Black sociological perspectives and mainstream perspectives of specific sociologists. GE credit: Div.—I. (I.)

130. Race Relations (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Functions of the social definitions of race and racial groups. Analysis of racial conflict, oppression, and other forms of ethnic stratification. Models of ethnic interaction and social change. Emphasis on racial relationships within the U.S. GE credit: Div.—I, II. (I, II.)

131. The Family (4)
Lecture—3 hours; discussion—1 hour. Contemporary family life in historical and cross-cultural perspective. How different family forms arose, their significance today and prospects for further family change. Attention to power relations within and beyond the family and to the social implications of family transformation. GE credit: SocSci, Div, Wrt.—I, II, III. (I, II, III.)

132. The Sociology of Gender (4)
Lecture—3 hours; discussion—1 hour. Analysis of biological, psychological, cultural and structural conditions underlying the status and roles of men and women in contemporary society, drawing on a historical and comparative perspective. GE credit: SocSci, Div.—I, II, III. (I, II, III.)

133. Sexual Stratification and Politics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 132 or the equivalent or consent of instructor. Analysis of origins, dynamics, and social implications of sexual stratification. Examination of classical and contemporary theorists such as Engels, Freud, J.S. Mill, de Beauvoir, Juliet Mitchell, D. Dinnerstein. Attention to selected issues in social movements for and against sexual equality. GE credit: Div.

134. Sociology of Racial Ethnic Families (4)
Lecture—3 hours; discussion—1 hour or term paper. Asian American, Black, Chicano, and Native American family life in comparative historical perspective. Family structure and gender roles are considered in relation to socio-historical dynamics. Offered in alternate years. GE credit: Div, Wrt.

135. Social Relationships (4)
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 1, 2 or 3, and upper division standing. Social and cultural factors influencing friendships and intimate relationships. Topics include relationship development, relationship maintenance, and relationship loss. GE credit: Div, Wrt.—II. (II.)

137. African American Society and Culture 1790-1990 (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 1. Political and social transformations of African American communities between 1790 and 1990, as seen through film, literature, and music. Topics include: Black consciousness, Afro-Slave culture, The Harlem Renaissance, and contemporary Hip Hop.—II. (II.)

138. Economic Sociology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or 1B and upper division standing in the social sciences. Overview of the rapidly growing field of economic sociology. Focus on variations in the ways that markets are organized. The relationship between individual and collective rationality will also be emphasized.—I, II, III. (I, II, III.)

139. Corporations and Society (4)
Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1 or 2 or 3, and upper division standing. The study of the history and power of the modern corporation; corporate organization; politics, the state, and the corporation; labor unions and the labor process; competition, regulation and international markets; the multinational and conglomerate corporation; and mass markets and consumerism.—I, II, III. (I, II, III.)

140. Social Stratification (4)
Lecture—3 hours; discussion—1 hour or term paper or research project (instructor's option). Systems of social ranking, theories of stratification; power, prestige, culture, and styles of life of various social classes; social mobility and its consequences for social structure.—I, II, III. (I, II, III.)

141. Industrialization and Social Change (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Selected technological and social factors. Preconditions of economic development and industrialization. Social, political, and cultural issues at various levels of economic development. Major historical differences and major current trends. Emphasis either on highly industrialized countries or on less developed countries. GE credit: Wrt.—II. (II.)

143A. Urban Society (4)
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Theories of city origins. Analysis of the historic process of urbanization and of varying city types. Comparison of American and European experience of metropolitanization, counterurbanization, and neighborhood change. Consideration of competing theories of urban growth and change and competing visions of the urban future. Offered in alternate years.—II. (II.)

143B. Sociology of City Life (4)
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent; course 143A recommended. Critical dissection of the "loss of community" issue. Analysis of the organization of primary ties in the city, of the culture of urban public life and of the learning of city skills. Offered in alternate years. GE credit: Wrt.—III.

144. Agriculture and Society (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: advanced standing in the social sciences or one year of course work in agricultural and environmental sciences. Development of agriculture as a major enterprise in modern society with the concomitant reduction in the labor force and family farms. Analysis of issues including mechanization, migrant labor, corporate farming, and public resource policy. Offered in alternate years.—(I.)

145A. Sociology of Third World Development (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; upper division standing. Introduction to theories and contemporary issues in the sociology of development. Topics such as urbanization, rural/agrarian change, class, status groups, international division of labor, sectoral shifts, international capital, informal economy, gender, and political processes are analyzed within a comparative-historical framework. GE credit: Div, Wrt.—II. (II.)

145B. Gender and Rural Development in the Third World (4)
Seminar—4 hours. Prerequisite: course 1; upper division standing. Political-economic analysis of women and work during the process of socioeconomic change in the world with particular attention to the family/household context. Offered in alternate years. GE credit: Div, Wrt.—(II.)

146. Sociology of Religion (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Relationship between social structures and religions. The social setting of the major world religions. Religious innovators and institutionalization (churches, sects, cults). Secularization in the modern world and the rise of secular ideologies. Offered in alternate years. GE credit: SocSci, Div, Wrt.—II.

147. Sociological Perspectives on East Asia (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological theories and concepts applied toward understanding East Asian society. Emphasis on the political structure, stratification, and economy in China and Japan. Analysis of historical and contemporary similarities and differences. Offered in alternate years.—(III.)

148. Collective Behavior (4)
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Study of behavior of human crowds and masses in extraordinary circumstances, including crowd panics, mass scares, collective protests, riots, revolutionary situations, ecstatic and revivalist gatherings, crazes, fads, and fashions.—I. (I.)

149. Religion and American Society (4)
Lecture—3 hours; class project. Historical, contemporary survey of religious traditions and organizations and their relation to U.S. social and cultural patterns. Civil religion, religious pluralism, minority and deviant communities, religious migration, U.S. religion as a social institution, and religion, politics, and social stratification. Offered in alternate years. GE credit: Div, Wrt.—(III.)

150. Criminology (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological analysis of criminal behavior in relation to social structure and the criminalization process.—I, II, III. (I, III.)

151. The Criminal Justice System (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 150 and upper division standing. Sociological analysis of the different components of the criminal justice system including the emergence and interpretation of criminal laws, the contemporary roles and functions of the police, criminal courts and correctional institutions.—II. (II.)

152. Juvenile Delinquency (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Study of juvenile delinquency in relation to the family, peer groups, community, and institutional structures. Consideration of processing of the delinquent by formal agencies of control.—I, II, III. (I, II, III.)

153. The Sociology of Childhood (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. Contemporary childhood in historical, cross-cultural, and global perspectives. Examine changes in understanding of the nature of childhood and "best interests of the child" by class, race, gender, geographic region, and historical period.—I. (I.)

154. Sociology of Health Care (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Overview of sociological research in medicine and health care, with emphasis on the organizational, institutional, and social psychological aspects.—I, III. (II.)

155. Sociology of Law (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Law considered as social control; relation of legal institutions to society as affecting judicial decision making and administration of justice. Lawyers as an occupational group. Legal reform.—I, III. (I, III.)

156. Social Movements (4)
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Analysis of several aspects of social movements: mobilization, forms of organization, ideology, recruitment, leadership, strategies and tactics, development, effects. Frequent use of sound and film materials. GE credit: SocSci.—II, III. (II, III.)

157. Social Conflict (4)
Lecture-3 hours; discussion-1 hour or term paper or project. Analysis of the causes, dynamics, and regulation of social conflict within and between various kinds of social groupings with particular reference to nonviolent methods of waging and regulating conflict.—III. (III.)

158. Women's Social Movements in Latin America (4)
Lecture—3 hours; term paper. Restricted to upper division standing. Contemporary women's social movements in Latin America, focusing on Honduras, El Salvador, Brazil, and Nicaragua. Examination of exploitation and oppression in Latin America.—I. (I.) Deeb-Sossa

159. Sociology of Work and Employment (4)
Lecture—3 hours; term paper or discussion—1 hour. Pass 1 restricted to upper division majors and graduate students. Historical and contemporary overview of employment, work, and occupations in American society. Study of authority and power relations, labor markets, control systems, stratification, and corporate structures, and how these factors shape work in diverse or organizational and employment setting.—I, III. (I, III.) Smith

160. Sociology of the Environment (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing in Sociology recommended. Production, consumption, and urban expansion. Basic social logics surrounding current problems of resource scarcity (environmental extractions) and excess wastes (environmental additions). Ways that society can change and reorganize itself to become more environmentally conscious and hence ecologically sustainable.—II. (II.)

170. Population (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Introduction to the study of human population, including theories and statistical measures; social causes and consequences of population trends; changes in population structure; geographical distribution, migration, socio-psychological factors affecting fertility. GE credit: SocSci.

171. Sociology of Violence and Inequality (4)
Lecture/discussion—4 hours. Prerequisite: upper-division standing or consent of instructor. How systems of social inequality organize the practice of violence. Definitions of violence and issues affecting the social capacity for violence. Analysis and comparison of different forms of violence associated with race, class, gender relations and social organization.—II. (II.)

172. Ideology of Class, Race and Gender (4)
Lecture—4 hours. Examination of popular belief systems that accompany relations between social classes, whites and blacks, and men and women in the United States. How do dominant groups attempt to justify each relationship, and is there ideological conflict or consensus between groups. GE credit: Div, Wrt.—I. (I.)

173. Sociology Through Literature (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Introduction to analysis of literature as sociological data. Reading of numerous works on American and other societies by authors such as Steinbeck, Lewis, Dreiser, Schulberg, Orwell, etc.

174. Sociology of the Jewish Experience (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: upper division standing required. The sociology of Jewish life, analyzing challenges to Jewish identity and community in the diaspora. Diversity within the Jewish community, Americanization, women, new immigrants, post-Holocaust Jewish identity, and Black-Jewish relations. Offered in alternate years.—(III.)

175. Mass Communication (4)
Lecture—3 hours; term paper. Prerequisite: course 1 or 2. Examines the relationship between the media and social structures. History of media–state relations. Media as reflector and shaper of values. Emphasis on current European and Marxist and pluralist theories rather than on content analysis. Offered in alternate years.—I.

176. Sociology of Knowledge, Science, and Scientific Knowledge (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: upper division standing preferred. Social, cultural, and historical dimensions of knowledge, especially scientific knowledge. Problems, methods, and theory in sociology of scientific knowledge. Laboratory and historical case studies. Scientific and technical knowledge in institutional and organizational contexts. (Same course as Science and Technology Studies 176.)—I. (III.)

180A. Complex Organizations (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 1; Economics 1A and 1B recommended. Develops a sociological approach to organizations theory. Designed to introduce sociological concepts, address the alternative psychological and economic models, and involve students in the practice of organizational analysis.—I, III. (I, III.)

180B. Complex Organizations (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 180A or consent of instructor. Builds on concepts and skills developed in course 180A. Deals with the issues of organizational decision making, design, and survival. Emphasis on relations between organizations and the effects of those relations in both the public and private sectors.

181. Social Change Organizations (4)
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 1. Analysis of organizations with social change and improvement goals and programs, emphasizing voluntary associations and grassroots citizen groups. Topics treated include formation, decision making and leadership, strategies and tactics, factionalism and coalitions, effectiveness. Offered in alternate years. GE credit: Wrt.—III. (III.)

182. Experimental and Utopian Communities (4)
Lecture—3 hours; discussion—1 hour. The social structure of intentional, experimental or Utopian settlements and communitarian movements, including comparison with other small settlement forms: villages, neighborhoods, monasteries, encampments and nonsettlement communities based on occupation, ethnicity, and religion.

183. Comparative Organizations (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 180A or 180B; upper division standing. Examination of economic and political organizations of major industrial nations. Discussion of historical, cultural, social, and political influences on industrial patterns and practices, alternative theoretical models for explaining differential development. Societies may include Sweden, Japan, Germany, Taiwan, and South Korea. Offered in alternate years.—I. (I)

185. Sociology of Social Welfare (4)
Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological analysis of the evolution and current organization of welfare functions in modern societies.—I, III. (I, III.)

188. Social Stratification in China (4)
Lecture—3 hours; term paper. Prerequisite: upper division standing. Social and political systems and patterns of social stratification in relation to change in state power and economic institutions in China since 1949. Offered in alternate years.—I.

189. Social Science Writing (4)
Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 46A, upper division standing, and 12 units of social science. Improved analytic writing and methods for reporting social science research to a wider public. Sociological analysis of the conditions of good and bad writing.

190X. Seminar in Sociological Analysis (4)
Seminar—3 hours; term paper. Prerequisite: upper division standing and course 100 (former course 165A). In-depth examination at an upper division level of a special topic in Sociology. Emphasis on student participation in learning. May not be repeated for credit. Limited enrollment.—(I, II, III.)

191. Workshop in Contemporary Sociological Theory (4)
Lecture—2 hours; workshop—1 hour; term paper. Prerequisite: course 100 (former 165A) and senior standing. Workshop in contemporary sociological theory that allows students to explore the uses of theory in empirical inquiry on problems of interest to students. Contemporary theory considered in relation to classical and modern influences, concept formation, theory construction, and explanation. Not open for credit to students who have received credit for course 165B.—III. (III.)

192. Internship and Research Practicum (2-6)
Internship—6-18 hours. Prerequisite: course 46A, upper division standing, approval of proposed internship and course 193 concurrently or consent of instructor. Supervised internship and study in an agency, organization, or institution; application of sociological concepts to the work experience. May be repeated for credit with consent of instructor. Maximum of 4 units may be counted toward the major. (P/NP grading only.)—I, II, III. (I, II, III.)

193. Workshop in Field Research (2)
Lecture/discussion—2 hours. Prerequisite: course 46A, course 192 or 199 concurrently for two-four units, senior standing. Overview of the process of collecting, recording, analyzing, and reporting qualitative social data. Emphasis on application of prin-

ciples; each participant completes an original research project. Not open for credit to students who have completed course 194HA.—I, II, III. (I, II, III.)

194HA-194HB. Special Study for Honors Students (4-4)
Seminar—3 hours; term paper. Prerequisite: senior standing and admission to the Honors Program. Directed reading, research and writing culminating in the preparation of a Senior Honors Thesis under direction of faculty adviser. (Deferred grading only pending completion of sequence.)—I, II. (I, II.)

195. Special Topics in Sociological Analysis (4)
Seminar—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. In-depth examination of topics in sociology. Emphasis on student research and writing. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

197T. Tutoring in Sociology (1-4)
Tutorial—3-12 hours. Prerequisite: upper division standing; completion of appropriate course with distinction. Activities vary depending on the nature of the course assignment. May include (but not limited to) tutoring on course material, advising on projects and papers, and leading discussion groups. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: open to seniors only. (P/NP grading only.)

Graduate Courses

201. Social Research (4)
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative survey of sociological inquiry, taught as a practicum. Philosophy of social science; values and research; research agendas and research problem formulations; research process; explanations. interpretation; study design; concept formation, measure, sampling, data acquisition, inference; rhetoric and presentation of findings.

206. Quantitative Analysis in Sociology (4)
Lecture—4 hours. Prerequisite: course 106. Survey of the statistical models and methods that serve as a foundation for quantitative research in sociology, with an emphasis on multivariate regression analysis, as well as measurement theory and time series analysis. (S/U grading only.)—II. (II.)

207A-207B. Methods of Quantitative Research (4-4)
Lecture—3 hours; paper. Prerequisite: course 106 or the equivalent. Principles of study design, examination of measurement, survey research methods and multivariate analysis. Course will stress actual practice of techniques. Students will carry out quantitative data analysis using packaged computer programs. (Deferred grading only, pending completion of sequence.)

208. Topics in Advanced Quantitative Methods in Social Science (4)
Seminar—3 hours; term paper. Prerequisite: course 206 or the equivalent and graduate standing; major graduate student. Analysis of the logic and application of an advanced statistical model; the particular model chosen may vary. Emphasis on the model's assumptions, its strengths and weaknesses, its application for social science inquiry, and the relationship between methods and social theory. May be repeated up to 12 units for credit. Offered in alternate years.

215. Economy, Polity, and Society (4)
Seminar—3 hours; paper. Prerequisite: consent of instructor. Open to graduate students in sociology and related disciplines. Course introduces students to topics and selected issues in the related fields of economic and political sociology and political economy.

220. Deviance, Law, and Social Control (4)
Seminar—3 hours; projects. Prerequisite: course 120 or consent of instructor. Report and discussions of literature on selected forms of deviance in relation to law and formal social control. Agency contacts and exploratory research projects.

224. Sociology of Education (4)
Seminar—3 hours; term paper. Prerequisite: course 206 or the equivalent recommended. Overview of sociological theories accounting for the form, role, and evolution of educational systems. Emphasis on empirical research on education and social stratification and application to educational policy. Topics include tracking, racial/ethnic achievement inequalities, school organization, and the immigrant experience.

225. Cultural Sociology (4)
Seminar—3 hours, term paper. Explores the varied ways in which culture is understood in the social sciences and the research questions that follow from contrasting viewpoints. The approach is historically informed and focused on changing cultural forms in relation to industrialization and post-modernism. Offered in alternate years.

226. Sociological Social Psychology (4)
Seminar—3 hours; seminar paper—1 hour. Prerequisite: graduate standing or consent of instructor. Advanced study of the varying approaches, methods, issues and topical concerns of sociological social psychology. Analysis of central and representative historical and contemporary works.

227. Sociology of Reproduction (4)
Lecture—3 hours; discussion—1 hour. Recent social science scholarship in such areas as teenage pregnancy, family planning, abortion, adoption, AIDS, and new reproductive technologies; focus on the current situation in the United States. Offered in alternate years.

230. Ethnic (Race) Relations (4)
Lecture—3 hours; term paper. Advanced study of the determinants of ethnic groupings and their interrelationships. Major theme will be the patterns of ethnic stratification and causes of ethnic conflict. Specific focus upon dominance and resistance to dominance. Influence of social science research.

233. Gender, Culture, and Local/Global Transformation (4)
Seminar—3 hours; term paper. Focus on critical approach to women and development; analyze local transformations with global connections within specific cultural contexts. Course covers theory, methodological issues, and relationship between theory and practice. Offered in alternate years.

234. Gender, Family, and Society (4)
Seminar—3 hours; seminar paper. Prerequisite: graduate standing or consent of instructor. The major theoretical traditions and concerns in family sociology and sociology of gender. Analysis of selected classical and contemporary works representative of functionalist, Marxist, psychoanalytic, feminist and critical theoretical approaches to these subjects (e.g., Engels, Parsons, Freud, Horkheimer, Goode, Lasch, Mitchell). Emphasis on macro and historical questions.

242A-242B. Comparative Methods in Historical Sociology (4-4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Comparative approaches to major historical phenomena such as nationalism, bureaucratization, feudalism, and capitalism; the relevance of psychological and sociological theories to historical interpretation; the verifiability of historically grounded hypothesis; the meaning of analogy, correspondence and causality. (If taken as a sequence, deferred grading only, pending completion of sequence.)

243. Urban Society (4)
Seminar—3 hours; term paper. Broad overview of the issues and concerns of the field of urban sociology. Special emphasis on the human experience of urban living in contemporary, cross-cultural or historical settings.

245. Developing Societies (4)
Seminar—3 hours; term paper or project. Prerequisite: graduate student status or familiarity with problems of developing societies. Analysis of social and economic problems of developing societies from the standpoint of theory and research on modernization and underdevelopment. Nature of third world dependency and interdependence in the global political economy. Offered in alternate years.

248. Social Movements (4)
Seminar—3 hours; term paper. Analysis of current issues in and contributions to the study of collective behavior and social movements; particular focus upon the strategies and tactics of social movements.

254. Sociological Issues in Health Care (4)
Seminar—3 hours; term paper. Prerequisite: open to graduate or professional students. Sociological perspectives and methods directed to health care issues. Students select topics for supervised research. The course will have a theme (described in advance) each time it is offered. Paper on research will be required. (S/U grading only.)

255. Sociology of Law (4)
Seminar—4 hours. Prerequisite: consent of instructor. Analysis of the nature of the legal process and its impact on social behavior. Will consider (1) nature and functions of law, (2) the organization and administration of law, and (3) the capacity of law to affect social behavior.

265A. Classical Sociological Theory (4)
Lecture—3 hours; discussion—1 hour. Introduces graduate students to the work of the main classical thinkers in the tradition of social theory, such as Marx, Durkheim, Weber, Simmel, Freud, G.H. Mead, and Parsons, locating them within the historical, cultural, and philosophical milieu in which their ideas originated.

265B. Theory in Contemporary Sociology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 265A. Explores the uses of theories in contemporary sociology by tracing their connections with classical sociological writings and their relations to broader theoretical concerns of contemporary social thought, with particular emphasis on relevance to the current historical, cultural and social milieu.

270. Social Demography (4)
Seminar—4 hours. Prerequisite: course 170 or consent of instructor. How social institutions affect and are affected by the level and variation of mortality, migration, and fertility. Special emphases on the determinants of fertility-related attitudes and behavior, on less-developed countries, and on contemporary empirical studies.

280. Organizations and Institutions (4)
Seminar—4 hours. Theory of formal organizations and bureaucracy. Methods of research in organizational and institutional studies. Historical and comparative analysis of political, religious, educational, military, and economic structure.

290. Seminar (4)
Seminar—3 hours; term paper. (S/U grading only.)

292A-292B. Field Research (4-4)
Seminar—3 hours; field trips. Prerequisite: graduate standing in Sociology or consent of instructor. The process of collecting, analyzing and reporting qualitative social data: techniques of intensive interviewing, participant-observation and document analysis; generating, developing, and evaluating analytic frameworks; recording, storing, retrieving, and writing up qualitative data. Emphasis on application of principles; each participant completes a fieldwork project. (Deferred grading only, pending completion of sequence.)

293. Proseminar in Sociology (2)
Seminar—2 hours. Prerequisite: first-year Sociology graduate students only. Introduction to graduate training in sociology. A seminar designed to introduce students entering graduate work in the department to its ongoing research activities. (S/U grading only.)—(I.)

295. Special Topics Seminar. (4)
Lecture/discussion—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Research topics in Sociology. Specific topic will vary according to faculty interest and student demand. May be repeated for credit when topic differs.—I, II, III. (I, II, III.)

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

299. Individual Study (1-12)
(S/U grading only.)

Professional Courses

390A. The Teaching of Sociology (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing; required for first-time teaching assistants. Practical instruction in teaching methods for qualitative and quantitative courses. Pedagogical issues involved in critical sociological analysis. (S/U grading only.)—I. (I.)

390B. The Teaching of Sociology (2)
Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing. Practical instruction in devising course syllabi, lectures and assignments for Associate-Instructors and others interested in college teaching. Discussion of pedagogical methods of teaching qualitative and quantitative courses. (S/U grading only.)—II. (II.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Professional Course

466. Research Paper Workshop (2)
Workshop—1.5 hours; discussion—0.5 hours. Prerequisite: Master of Arts standing. A workshop to assist advanced graduate students in the preparation of an original research paper. Students present their research papers and discuss issues in theory, research design, data, empirical inference, and verbal and written presentation of a professional research paper. (S/U grading only.)

Soil Science

See Geology, on page 315; Soil Science, on page 493; Soils and Biogeochemistry (A Graduate Group), on page 494; and Soil and Water Science, on page 494.

Soil Science

(College of Agricultural and Environmental Sciences)

Faculty. See Land, Air and Water Resources, on page 354.

Major Programs. See the Soils and Biogeochemistry track in Environmental Science and Management, on page 289.

Minor Program Requirements:

The Department of Land, Air and Water Resources, Soils and Biogeochemistry Program, offers a minor program in soil science. The minor is especially geared toward students in the environmental sciences including Hydrologic Science, Environmental Science and Management, Environmental Toxicology, Ecological Management and Restoration, International Agricultural Development, Crop Science and Management, Environmental Horticulture and Urban Forestry, Geology, and Plant Biology.

	UNITS
Soil Science	**21**
Soil Science 100	5
Courses selected from Soil Science 102, 105, 107, 109, 111, 112, 118, 120, Plant Sciences 158, Hydrologic Science 124, 134	16

Minor Adviser. R.J. Southard *(Land, Air and Water Resources)*

Graduate Study. Programs of study leading to the M.S. and Ph.D. degrees in Soils and Biogeochemistry are available. Information regarding these programs can be obtained from the graduate advisers, at *http://soils.ucdavis.edu/* and in the Graduate Announcement. See also Graduate Studies, on page 109.

Graduate Adviser. Wendy Silk *(Land, Air and Water Resources)*

Courses in Soil Science (SSC)

Questions pertaining to the following courses should be directed to the instructor, to the Resource Sciences Teaching Center in 1152 Plant and Environmental Sciences Building (530) 752-1669, or see undergraduate and graduate Soils and Biogeochemistry courses at *http://lawr.ucdavis.edu/undergrad_sws.htm* or *http://lawr.ucdavis.edu/graduate_sbg.htm*.

Lower Division Courses

10. Soils in Our Environment (3)
Lecture—3 hours; independent study. Soils in our global ecosystem; soils as natural bodies formed by interactive environmental processes; soil response to use and management; sustainable use of soil resources; role of soils in agricultural and environmental issues; role of soils in our daily lives. Limited enrollment. GE credit: SciEng.—I. (I.) Dahlgren

92. Soil Science Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

100. Principles of Soil Science (5)
Lecture—3 hours; laboratory—3 hours; term paper. Prerequisite: Chemistry 2A-2B, Physics 1A-1B, Biological Sciences 1A; Geology 50, Biological Sciences 1C recommended. Soil as part of natural and managed ecosystems and landscapes. Solid, liquid, and gas phases and their interactions in the soil. Water, gas and heat movement in soil. Soil biology. Plant nutrient acquisition and use. Soil development, management and use.—I. (I.) Scow, Southard

102. Soil and Water Chemistry (5)
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 100 or the equivalent. Soil solution and solid-phase chemistry of soils in relation to agricultural and environmental concerns. Interactions between soil solids, precipitates and solution phases: mineralogy, ion exchange, adsorption, weathering and buffering, soil colloidal behavior, models of solution and solid-phase interactions.—II. (II.) Parikh

105. Field Studies of Soils in California Ecosystems (5)
Prerequisite: courses 100 and 120, or equivalent recommended. Field-based studies of soils in California ecosystems, away from campus, throughout California. Emphasis on description and classification of soils; relationships among soils, vegetation, geology, and climate; physical, chemical, and biological processes in soils on the landscape; and the role of soils in land use. May be repeated one time for credit.—IV. (IV.) Amundson, Dahlgren, O'Geen, Southard

107. Soil Physics (5)
Lecture—3 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 100, Environmental and Resource Sciences 100, Mathematics 16A, or the equivalent. Physical properties of soil. Principles of water, gas, heat, and solute movement in soil with selected examples related to soil and water management. Influence of soil properties on transfer processes.—I. (I.) Hopmans

109. Sustainable Nutrient Management (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or the equivalent. Availability of nutrients in organic and conventional agricultural, vineyard, orchard and plantation forest soils; management of fertilizers, cover crops, compost, sewage sludge and manures for crop production and to prevent loss to the environment is emphasized.—III. (III.) Horwath

111. Soil Microbiology (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1C and Biological Sciences 1C. Major groups of microorganisms in soil, their interrelationships, and their responses to environmental variables. Role of microorganisms in cycling of nutrients. Plant-microbe relationships. Transformations of organic and inorganic pollutants.—II. (II.) Scow

112. Soil Ecology (3)
Lecture—2 hours; laboratory/discussion—2 hours. Prerequisite: Biological Sciences 1B, 1C, course 100. The biology and ecology of soil communities, emphasizing the soil food web and litter decomposition. Role of specific biota, ranging from microorganisms to earthworms. Applications to restoration, remediation, ecosystem science, and agriculture. GE credit: Wrt.—I. (I.) Jaffee

118. Soils in Land Use and the Environment (4)
Lecture—3 hours; discussion—1 hour; one one-day field trip. Prerequisite: course 100 or consent of instructor. Soils are considered as elements in land use planning and environmental quality. Topics include: soil survey reports, remote sensing, land capability classification, soil erosion/conservation, waste disposal on soils and soil reclamation.—III. (III.) O'Geen

120. Soil Genesis, Morphology, and Classification (5)
Lecture—4 hours; laboratory—3 hours (includes five one-day weekend field trips). Prerequisite: course 100; Geology 50 recommended. Recognition and description of soils; chemical, biological and physical processes of soil formation. Factors of soil formation. Interactions of soils with diverse ecosystems. Introduction to soil classification. Practice using soil taxonomy. Practical experience describing soil properties in the field.—III. (III.) Southard

192. Soil Science Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

202. Topics in Advanced Soil Chemistry (3)
Lecture/discussion—3 hours. Prerequisite: undergraduate course in soil chemistry, water chemistry, or consent of instructor. Reviews of current research in soil chemistry. Topics include double layer theory; clay mineral and oxide surface chemistry; adsorption on soil surfaces; speciation and modeling of solution ions; solubility and mineral stability diagrams. Discussion of current journal articles. May be repeated one time for credit when topic differs. Offered in alternate years.—II. Parikh

205. Field Studies of Soils in California Ecosystems (5)
Fieldwork—50 hours; discussion—15 hours; lecture—5 hours. Prerequisite: courses 100 and 120 or equivalent recommended. Field-based soil studies in California ecosystems. Description and classification of soils; relationships among soils, vegetation, geology, and climate; physical, chemical, and biological processes; their role in land use. Similar to SSC 105; requires additional work for graduate credit. May be repeated one time for credit if geographic locale changes. Limited enrollment.—IV. (IV.) Amundson, Dahlgren, Southard

208. Soil-Plant Interrelationships (3)
Lecture—3 hours. Prerequisite: course 100, Plant Biology 111B, or consent of instructor. Plant needs, occurrence and reactions of water and mineral nutrients in soils; root systems and their growth in soils; mass flow and diffusion mechanisms in nutrient acquisition; models relating nutrient uptake to soil and plant characteristics; nutrient assimilation and crop quality. Offered in alternate years.—(II.) Richards

209. Physiology and Ecology of Mycorrhizal Symbioses (3)
Lecture/discussion—3 hours. Prerequisite: Plant Biology 111 or consent of instructor; course 100 recommended. Structure, function and evolutionary development of mycorrhizal fungi and the root-fungal symbiosis. Emphasis on regulation of carbon and nutrient exchanges between host and symbiont. Course integrates mycorrhizal physiology and ecology in an ecosystem context. Offered in alternate years.—(I.) Bledsoe

211. Advanced Soil Microbiology (3)
Lecture—3 hours. Prerequisite: Chemistry 8A-8B; course 111; Biological Sciences 102, 103 or an equivalent course recommended. Microbial metabolism of organic chemicals in soil, both natural and xenobiotic. Decomposition of organic matter. Kinetics of microbial processes in soil. Offered in alternate years.—(III.) Scow

216. Physical Geochemistry (3)
Lecture—3 hours. Prerequisite: course 102 or Chemistry 110A or Geology 115 and Mathematics 119. First half emphasizes equilibrium thermodynamics, including choices of standard states, ideal solutions, and use of the Gibbs-Duhem relation. Second half covers geochemical kinetics including simple rate laws, transition state theory, solute diffusion, and experimental methods.—I. (I.) Casey

218. Soil Erosion and Conservation (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing; courses 118, 120. Processes of soil erosion by wind and water in agricultural areas, and methods of soil conservation will be discussed. Methods of predicting rates of soil erosion will be considered. Offered in alternate years.—(II.) Singer

219. Ecosystem Biogeochemistry (4)
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: introductory courses in ecology/biology and soils recommended; undergraduates accepted with consent of instructor. Multidisciplinary analysis of energy and nutrient transfers within terrestrial ecosystems. Examination of processes and inter- and intra-system interactions between the atmosphere, biosphere, lithosphere and hydrosphere. Laboratory section uses biogeochemical simulation models to examine case studies. (Same course as Ecology 219.)—III. (III.) Houlton

220. Pedology (3)
Lecture—3 hours. Prerequisite: consent of instructor; course 120 recommended. Topics selected from studies of soil-forming processes, soil-geomorphic relations, mineral weathering, new developments in soil classification, and development of pedologic theory. Topics vary from year to year. May be repeated one time for credit. Offered in alternate years.—(I.) Southard

222. Global Carbon Cycle (3)
Lecture—3 hours. Prerequisite: Chemistry 8A, 8B, Mathematics 16A, 16B, course 100 or the equivalent. Global carbon cycle from Phanerozoic epoch to modern times. Examination of long and short-term carbon cycles. Transfer of carbon among ocean, land and life with emphasis on humic substance formation, methods of characterization, reactions with organics and soil carbon stabilization. Offered in alternate years.—II. Horwath

290. Special Topics in Soil Science (1-4)
Seminar—1-4 hours. Prerequisite: graduate standing. Seminars and critical review of problems, issues, and research in soil science. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
Prerequisite: consent of instructor.

299. Research (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Soils and Biogeochemistry (A Graduate Group)

Kate M. Scow, Ph.D., Chairperson of the Group

Group Office. 1152 Plant & Environmental Sciences Building
(530) 752-1669; *http://soils.ucdavis.edu/*; *http://lawr.ucdavis.edu/ssgg/index.htm*

Faculty

Eduardo Blumwald, Ph.D., Professor *(Plant Sciences)*
Patrick Brown, Ph.D., Professor *(Plant Sciences)*
William Casey, Ph.D., Professor *(Chemistry)*
Randy Dahlgren, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Valerie Eviner, Ph.D., Assistant Professor
(Plant Sciences)
Graham Fogg, Ph.D., Professor
Mark Grismer, Ph.D., Professor
Peter Hernes, Ph.D., Associate Professor
Jan Hopmans, Ph.D., Professor
William Horwath, Ph.D., Professor
Ben Houlton, Ph.D., Assistant Professor
Louise Jackson, Ph.D., Professor
Mark Matthews, Ph.D., Professor
(Viticulture and Enology)
Alexandra Navrotsky, Ph.D., Professor
Parikh, Sanjai, Ph.D., Assistant Professor
Eliska Rejmankova, Ph.D., Professor
(Environmental Science and Policy)
James Richards, Ph.D., Professor
Eliska Rejmankova, Ph.D., Professor
(Environmental Science and Policy)
Peter Schiffman, Ph.D., Professor *(Geology)*
Kate Scow, Ph.D., Professor
Kenneth Shackel, Ph.D., Professor *(Plant Sciences)*
Wendy Silk, Ph.D., Professor
Johan Six, Ph.D., Professor *(Plant Sciences)*
David Smart, Ph.D., Associate Professor
(Viticulture and Enology)
Randal Southard, Ph.D., Professor
Kerri Steenwerth, Ph.D., Adjunct Assistant Professor
(Viticulture and Enology)
Shrinivasa Upadhyaya, Ph.D., Professor
(Agricultural & Biological Engineering)
Susan Ustin, Ph.D., Professor
Chris van Kessel, Ph.D., Professor *(Plant Sciences)*

Emeriti Faculty

Caroline Bledsoe, Ph.D., Professor Emeritus
Theodore Hsiao, Ph.D., Professor Emeritus
André Läuchli, Ph.D., Professor Emeritus
Miguel Marino, Ph.D., Distinguished Professor Emeritus
Roland Meyer, Ph.D., Professor Emeritus
Dennis Rolston, Ph.D., Professor Emeritus
Michael Singer, Ph.D., Professor Emeritus
Robert Zasoski, Ph.D., Professor Emeritus

Affiliated Faculty

Victor Claassen, Ph.D., Associate Researcher
Joseph DiTomaso, Ph.D., Specialist in Cooperative Extension *(Plant Sciences)*
Stephen Grattan, Ph.D., Water Relations Specialist
Krassimira Hristova, Ph.D. Assistant Researcher
Jeffrey P. Mitchell, Ph.D., Specialist in Cooperative Extension *(Plant Sciences)*
A. Toby O'Geen, Ph.D., Specialist in Cooperative Extension
G. Stuart Pettygrove, Ph.D., Soils Specialist
Ken Tate, Ph.D., Specialist in Cooperative Extension *(Plant Sciences)*

Graduate Study. The Soils and Biogeochemistry Graduate Group offers programs of study and research leading to the M.S. and Ph.D. degrees. The focus of Soils and Biogeochemistry is on the physical, chemical and biological processes occurring in soils of different landforms and ecosystems. The goal is to understand the complex processes of mass and energy flow that control agricultural and natural ecosystem functions, productivity, and sustainability. Investigations assess impacts and implications of natural processes and anthropogenic effects, such as climate change, on soil and ecosystem behavior and development. Examples include: fate and emission of greenhouse gases; soil carbon sequestration; fate and transport of native and applied chemicals; soil microbial ecology; nutrient uptake and management; nutrient cycling in managed and wildland ecosystems; pesticide and trace element adsorption on surfaces; mineral weathering; organic agriculture; bioavailability of toxics; soil erosion; conservation; ecosystem productivity and sustainability; and the study of soil evolution on the landscape. These studies are carried out within a framework of integrating applied chemical, physical, mathematical, and biological sciences.

Graduate Advisers. Wendy Silk, Ph.D.

Graduate Admissions Officer. A. Toby O'Geen, Ph.D.

Soil and Water Science

This major has been discontinued as of Fall 2008; see Environmental Science and Management, on page 289.

(College of Agricultural and Environmental Sciences)

Spanish

(College of Letters and Science)

Cecilia Colombi, Ph.D., Chairperson of the Department

Department Office. (Spanish and Classics) 618 Sproul Hall (530) 752-0835; *http://spanish.ucdavis.edu*

Faculty

Marta E. Altisent, Ph.D., Professor
Samuel G. Armistead, Ph.D., Professor
Emilio Bejel, Ph.D., Professor
Leopoldo Bernucci, Ph.D., Professor
Robert Blake, Ph.D., Professor
Travis Bradley, Ph.D., Associate Professor
Cecilia Colombi, Ph.D., Professor
Linda Egan, Ph.D., Associate Professor
Cristina González, Ph.D., Professor
Robert Irwin, Ph.D., Professor
Michael Lazzara, Ph.D., Associate Professor
Adrienne Martín, Ph.D., Professor
Cristina Martínez-Carazo, Associate Professor
Robert Newcomb, Ph.D., Assistant Professor
Almerindo E. Ojeda, Ph.D., Professor *(Linguistics)*
Ana Peluffo, Ph.D., Associate Professor

Emeriti Faculty

Zunilda Gertel, Ph.D., Professor Emerita
Mario González, Ph.D., Lecturer Emeritus
Didier T. Jaén, Ph.D., Professor Emeritus
Daniel S. Keller, Ph.D., Professor Emeritus
Fabián A. Samaniego, M.A., Senior Lecturer Emeritus
Hugo J. Verani, Ph.D., Professor Emeritus

Affiliated Faculty

Francisco Alarcón, M.A., Lecturer
Norma López-Burton, M.A., Lecturer

The Major Program

The Spanish major program assures proficiency in all four language skills-speaking, understanding, reading, and writing-and acquaints students with the intellectual and cultural contributions of the Spanish-speaking world through a study of its language, literature, and cultural productions.

The Program. The department's lower division program gives students a solid foundation in the Spanish language, either through the traditional elementary and intermediate language series or through an accelerated three-course sequence of Spanish for native speakers. Linguistics 1 introduces students to a systematic study of language in general and serves as an introduction to upper division courses in Spanish linguistics. At the upper division level, students receive a broad introduction to basic concepts and the practice of literary and cultural criticism and to the four areas of study represented in the department's curriculum: Spanish linguistics, Spanish literature and culture, Latin-American literature and culture, and Latino literatures and cultures in the United States. Students are encouraged to work closely with the department's academic advisers in designing a program of studies tailored to their individual needs and interests. Many students combine the Spanish major with another major in the humanities or social sciences.

Student Learning Outcomes. Educational Objectives:

- Demonstrate effective communicative skills in Spanish in the Interpersonal, Interpretative and Presentational modes.
- Demonstrate cultural awareness with respect to the diversity of the Spanish speaking world by comprehending Spanish for native speakers in a variety of settings, types of discourse, topics, registers, and broad regional variations.
- Demonstrate awareness of genre and register in an oral and written mode.
- Demonstrate analytic, interpretive and critical thinking skills with respect to linguistics, literature and cultural studies.

Career Alternatives. The program, alone or in combination with other major programs, may lead to advanced study of the language or literature and culture of Spain and Spanish America, and to careers not only in teaching, but also in other professions such as library science, law, medicine, and in government, social service, business, or international relations.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter.....4-37

Spanish 1, 2, 3, 21 or 21S, 22 or 22S, 23 or 23S, and 24 or 24S..... 0-33
or Spanish 31, 32, 33..... 0-15
Linguistics 1..... 4
In consultation with a departmental adviser and with the consent of the department chairperson, Linguistics 1 may be taken concurrently with upper division courses.

Depth Subject Matter 45-48

One course in each of the following five areas..... 19-20
Spanish 100, 100S, 141, 141S, 170 or 170S..... 4
Spanish 111N, 115, or 116..... 3-4
Spanish 130, 131N, 134A or 142..... 4
Spanish 150N, 151N, 157, 159 or 159S 4
Spanish 117, 174, 176, or 177 4
Students planning to take Spanish 110 should do so at the beginning of the upper division sequence or concurrently with Spanish 100, 100S, 141, 141S, 170 or 170S.

Seven elective courses to be chosen in consultation with the student's major adviser 26-28
Students may, with the approval of their adviser, take up to two elective courses outside the Spanish department in such programs as Anthropology (Anthropology 144, 146), Chicana/o Studies (Chicana/o Studies 154, 155, 156, 160, 170, 171), Comparative Literature (Comparative Literature 152, 165, Education (Education 151, 152), History (History 159, 160, 161A, 161B, 164, 165, 166A, 166B, 167, 168, 169A, 169B), Linguistics (Linguistics 166), Native American Studies (Native American Studies 120, 133, 184), Art History (Art History 151), African American and African Studies (African American and African Studies 107A, 180). A maximum of six units of course 199 may be counted toward the major. Course 199 cannot be used to replace regular departmental courses.

Total Units for the Major 49-85

Major Advisers. Consult Department.

Advising. Given the great flexibility in the Spanish major, it is important that students design their programs in close consultation with their major adviser. This is especially important for students who intend to use their major as preparation for graduate study, for those who are planning a teaching career, and for those who wish to take advantage of our EAP options.

Minor Program Requirements:

UNITS

Spanish 23-24

One course in each of the following five areas:
Spanish 100, 100S, 141, 141S, 170, or 170S..... 4
Spanish 111N, 115, or 116.....3-4
Spanish 130, 131N, 134A, or 142 4
Spanish 150N, 151N, 157, 159 or 159S..... 4
Spanish 117, 174, 176, or 177 4
One upper division elective in Spanish 4
Consult a departmental adviser if any of these courses are to be taken abroad.

Honors Program. Candidates for high or highest honors in Spanish must write a senior thesis under the direction of a faculty member. For this purpose, honors candidates must enroll in at least six units of Spanish 194H distributed over two quarters. Normally, a student will undertake the honors project during the first two quarters of the senior year; other arrangements must be authorized by the department chair. Only students who, at the end of their junior year (135 units), have attained a cumulative GPA of 3.500 in courses required for the major will be eligible for the honors program. The requirements for earning high and highest honors in Spanish are in addition to the regular requirements for the major in Spanish.

Education Abroad Program Options. The department encourages its majors to consider study in a Spanish-speaking country with our Education Abroad Program (EAP). It is now possible for our students to complete significant portions of the Spanish major in the EAP centers at both the lower (Preparatory Subject Matter) and upper division levels through newly introduced options.

UC Davis Quarter Abroad. The Quarter Abroad Program offers programs in Mendoza, Argentina and in Madrid, Spain. These programs aim at providing students with opportunities to increase their knowledge of the Spanish language and cultures by experiencing the life-learning challenges of living and studying abroad.

Students will earn 15-22 UC Davis units toward the Spanish major, minor, or foreign language requirement. Each program may offer an upper division course taught by the UC Davis Program Director focusing on history, culture and society.

For more information, contact C. Colombi or C. Martínez-Carazo or see *http://quarterabroad.ucdavis.edu*.

Teaching Credential Subject Representative. C. Colombi; see the Teaching Credential/M.A. Program on page 114.

Graduate Study. The Department offers courses leading to the M.A. degree in Spanish to students who have completed with distinction the A.B. degree in Spanish, or the equivalent. Candidates will be recommended for admission to graduate studies in Spanish provided they meet the requirements of the Graduate Studies office and the Department of Spanish. The Department also offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Chairperson or the Graduate Director of the Spanish Department.

Graduate Adviser. Consult Department.

Prerequisite Credit. Credit normally will not be given for a course if that course is the prerequisite of a course already successfully completed. Exceptions can be made by the Department Chairperson only.

Courses in Portuguese (POR)

Lower Division Courses

1. Elementary Portuguese (5)
Lecture/discussion—5 hours; laboratory—1 hour. Introduction to Portuguese grammar and development of all language skills in a cultural context with special emphasis on communication. Students who have successfully completed Portuguese 2 or 3 in the 10th or higher grade of high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.—I. (I.)

2. Elementary Portuguese (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and development of all basic language skills in cultural context with special emphasis on communication.—II. (II.)

3. Elementary Portuguese (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of course 2 in the areas of grammar and development of all basic language skills in cultural context with special emphasis on communication.—III. (III.)

21. Intermediate Portuguese (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 3. Review and develop the grammar, vocabulary, and composition acquired in first year Portuguese through exercises and reading of modern texts.—I. (I.) Bernucci

22. Intermediate Portuguese (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 21. Continuation of course 21. Focus on more difficult grammar concepts and further composition practice. Development of all language skills through exercises and reading of modern texts.—II. (II.) Bernucci

23. Portuguese Composition I (4)
Lecture—3 hours; extensive writing. Prerequisite: course 22. Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Class activities include composition, journals, letters, individual and group projects.—III. (III.)

31. Intermediate Portuguese for Spanish Speakers (4)
Lecture/discussion—3 hours; laboratory—1 hour. Prerequisite: course 3 or the equivalent, or consent of instructor. Development of linguistic and learning skills required for Spanish-speaking students in upper-division courses in Portuguese.—II. (II.)

Upper Division Courses

100. Principles of Luso-Brazilian Literature and Criticism (4)
Lecture—3 hours; term paper. Prerequisite: course 3 or Spanish 24, 24S or 33. Principles of literary criticism applied to the study of fiction, poetry, and essays of major literary writers of the Luso-Brazilian world.—I. (I.) Bernucci

159. Special Topics in Luso-Brazilian Literature and Culture (4)
Lecture—3 hours; term paper. Prerequisite: course 3 or Spanish 24, 24S or 33. Special Topics in Luso-Brazilian Literature and Culture. May be repeated one time for credit.—I, II. (I, II.) Bernucci

161. Luso-Brazilian Literature and Culture (4)
Lecture/discussion—3 hours; term paper. Prerequisite: first year Portuguese or the equivalent. Colonial Brazilian literature survey. Readings include 16th-18th centuries manuscripts and books of cultural importance in a society dominated by censorship and with no printing presses. Study of the role literary Academies played in the so called "culture of manuscripts."—III. (III.) Bernucci

162. Introduction to Brazilian Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: first year Portuguese or the equivalent. Narrative and poetic texts of the 19th and 20th centuries in Brazil. In-depth and comparative study of Romantic and (Neo) Naturalist movements as a forum for discussion about literary tradition and modernity in Latin America.—I. (I.) Bernucci

163. 20th C Masters in Brazilian Literature (4)
Lecture/discussion—3 hours; term paper. Prerequisite: first year Portuguese or the equivalent. Overview of modern Brazilian literature from early 20th C to the poetry by João Cabral de Melo Neto and the Concretists (1960s), including European avant-garde movements and literary and cultural manifestos leading to a revolutionary body of literature.—II. (II.) Bernucci

198. Directed Group Study (1-5)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)—I, II. (I, II.) Bernucci

Courses in Spanish (SPA)

Course placement. Students with two years of high school Spanish normally take Spanish 2, those with three years take Spanish 3, and those with four years take Spanish 21. It is recommended that transfer students who have successfully completed a two-year sequence at the junior college level continue their study by taking Spanish 24, 24S, 100, 100S, 141, 141S, 170, or 170S. Consult a departmental adviser.

Lower Division Courses

1. Elementary Spanish (5)
Lecture/discussion—5 hours; laboratory—1 hour. Introduction to Spanish grammar and development of all language skills in a cultural context with special emphasis on communication. Not open for credit to students who have completed course 1S. Students who have successful completed Spanish 2 or 3 in the 10th or higher grade of high school may receive unit credit for this course on a P/NP grading basis only. Although a passing grade will be charged to the student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.—I, II, III. (I, II, III.)

1S. Elementary Spanish (5)
Lecture/discussion—5 hours; laboratory—1 hour. Introduction to Spanish grammar and development of all language skills in a cultural context with special emphasis on communication. Offered in a Spanish speaking country under the supervision of a UC Davis faculty/lecturer. Not open for credit to students who have completed course 1.—III.

2. Elementary Spanish (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 1 or 1S. Continuation of courses 1 and 1S in the areas of grammar and basic language skills. Not open for credit to students who have completed course 2S.—I, II, III. (I, II, III.)

2S. Elementary Spanish (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 1 or 1S. Continuation of Spanish 1 in the areas of grammar and basic language skills. Offered in a Spanish speaking country under the supervision of UC Davis faculty/lecturer. Not open for credit to students who have completed course 2.—III.

2V. Elementary Spanish (5)
Lecture/discussion—3 hours; web electronic discussion—2 hours. Prerequisite: course 1 or 1S. Continuation of course 1 or 1S in the areas of grammar and basic language skills. Hybrid format combining classroom instruction with technologically based materials. Not open to students who have taken course 2 or 2S.—I, II, III, IV. (I, II, III, IV.)

3. Elementary Spanish (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 2 or 2S. Completion of grammar sequence and continuing practice of all language skills using cultural texts. Not open for credit to students who have completed course 3S.—I, II, III. (I, II, III.)

3S. Elementary Spanish (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 2 or 2S. Completion of grammar sequence and continuing practice of all language skills using cultural texts. Offered in a Spanish speaking country under the supervision of UC Davis faculty. Not open for credit to students who have completed course 3.—III. (III.)

3V. Elementary Spanish (5)
Lecture/discussion—3 hours; web electronic discussion—2 hours. Prerequisite: course 2, 2S, or 2V. Completion of grammar sequence and continuing practice of all language skills using cultural texts. Hybrid format combining classroom instruction with technologically based materials. Not open to students who have taken course 3 or 3S.—I, II, III, IV. (I, II, III, IV.)

8. Elementary Spanish Conversation (2)
Discussion—3 hours. Prerequisite: course 3; course 21 (concurrently) recommended. Designed to develop oral communication skills. Emphasis on increasing vocabulary, improving listening comprehension, pronunciation, accuracy and grammar control. Practice of everyday situations. Not open to native speakers or to upper division students.—I, II, III. (I, II, III.)

21. Intermediate Spanish (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 3 or 3S. Review and develop the grammar, vocabulary and composition acquired in the first year through exercises and reading of modern texts. Students transferring from other institutions are recommended to start the second year program at this point. Not open for credit to students who have completed course 21S.—I, II, III. (I, II, III.)

21S. Intermediate Spanish (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 3 or 3S. Review and develop the grammar, vocabulary and composition acquired in the first year through exercises and reading of modern texts. Students transferring from other institutions are recommended to start the second year program at this point. Not open for credit to students who have completed course 21.—III. (III.)

22. Intermediate Spanish (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 21 or 21S. Continuation of course 21 and 21S. Focus on more difficult grammar concepts and further practice on composition. Development of all language skills through exercises and reading of modern texts. Not open for credit to students who have completed course 22S.—I, II, III. (I, II, III.)

22S. Intermediate Spanish (5)
Lecture/discussion—5 hours; laboratory—1 hour. Prerequisite: course 21 or 21S. Continuation of course 21 and 21S. Focus on more difficult grammar concepts and further practice on composition. Development of all language skills through exercises and reading of modern texts. Offered in a Spanish speaking country under the supervision of UC Davis faculty. Not open for credit to students who have completed course 22.—III. (III.)

23. Spanish Composition I (4)
Lecture—3 hours; extensive writing. Prerequisite: course 22 or 22S. Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Composition, journals, individual and group projects. Not open for credit to students who have completed 23S.—I, II, III. (I, II, III.)

23S. Spanish Composition I (4)
Lecture—3 hours; extensive writing. Prerequisite: course 22. Development of writing skills by way of reading, discussion, and analysis of authentic materials, literary texts, and videos. Selective review of grammar. Composition, journals, individual and group projects. Course is taught in a Spanish speaking country. Not open for credit to students who have completed course 23.—III.

24. Spanish Composition II (4)
Lecture—3 hours; extensive writing. Prerequisite: course 23 or 23S. Development of advanced level writing skills, with emphasis on how to write argumentative prose, essays, and research papers. Introduction to the analysis of literary genres. Compositions, journals, individual and group projects. Not open for credit to students who have completed course 24S.—I, II, III. (I, II, III.)

24S. Spanish Composition II (4)
Lecture—3 hours; extensive writing. Prerequisite: course 23. Development of advanced level writing skills, with particular emphasis on how to write argumentative prose, essays, and research papers. Introduction to the analysis of literary genres. Compositions, journals, individual and group projects. Course is taught in a Spanish speaking country. Not open for credit to students who have completed course 24.—III.

28. Intermediate Spanish Conversation (2)
Discussion—3 hours. Prerequisite: course 8 or 22. Continuation of course 8. Designed to develop oral communication skills at a more advanced level. Practice in more complex situations. (Former course 9.)—I, II, III. (I, II, III.)

31. Intermediate Spanish for Native Speakers I (5)
Lecture/discussion—3 hours; tutorial—1 hour; frequent writing assignments. Prerequisite: course 3 or the equivalent, or consent of instructor. First course of a three-quarter series designed to provide bilingual students whose native language is Spanish with the linguistic and learning skills required for successfully completing upper division courses in Spanish. Intensive review of grammar and composition.—I. (I.)

32. Intermediate Spanish for Native Speakers II (5)
Lecture/discussion—3 hours; tutorial—1 hour; frequent writing assignments. Prerequisite: course 31 or consent of instructor. Continuation of intensive review of grammar and composition. Development of all language skills through reading of modern texts, presentation/discussion of major ideas, vocabulary expansion, and writing essays on topics discussed. Designed for students whose native language is Spanish. (Former course 7B.)—II. (II.)

33. Intermediate Spanish for Native Speakers III (5)
Lecture/discussion—3 hours; tutorial—1 hour; frequent writing assignments. Prerequisite: course 32 or consent of instructor. Development of writing skills, with emphasis on experimenting with various writing styles: analytical, argumentative, and creative. Analytical review of literary genres. Written essays will

be assigned. Students will develop a research paper. Designed for students whose native language is Spanish. (Former course 7C.)—III. (III.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor and Department Chairperson. Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Principles of Hispanic Literature and Criticism (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24 or 24S or 33. Principles of literary criticism applied to the study of fiction, drama, poetry, and essay of major literary writers of the Hispanic world. Not open for credit to students who have completed course 100S.—I, II, III. (I, II, III.)

100S. Principles of Hispanic Literature and Criticism (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24 or 33. Principles of literary criticism applied to the study of fiction, drama, poetry and essay of major literary writers of the Hispanic world. Offered in a Spanish speaking country under the supervision of a UC Davis faculty/lecturer. Not open for credit to students who have completed course 100.—III.

110. Advanced Spanish Composition (4)
Lecture—3 hours; frequent writing assignments. Prerequisite: course 24 or 33. Practice in expository writing with emphasis on clarity and idiomatic expression. Practical application and review of selected grammar topics. (Part of former courses 110A and 110B.)—I, II, III. (I, II, III.)

111N. The Structure of Spanish: Sounds and Words (3)
Lecture—3 hours. Prerequisite: Linguistics 1 and course 24 or 33, or consent of instructor. A linguistic description of the sound patterns of Spanish and how those sounds can be used to form larger units, such as morphemes and words. Theoretical and practical comparisons with English and with other Romance languages. (Former course 132.)—I, II, III. (I, II, III.)

112N. The Structure of Spanish: Words and Phrases (3)
Lecture—3 hours. Prerequisite: course 111N. A study of Spanish word and phrase structure, with special emphasis on the constituent structure of noun and verb phrases. Theoretical and practical comparisons with English and with other Romance languages. (Former course 131.)—II, III. (II, III.) Blake, Ojeda

113. Spanish Pronunciation (4)
Lecture—3 hours; term paper. Prerequisite: Linguistics 1 and course 24 or 33. The sound structure of modern Spanish; theoretical analysis of selected problems in pronunciation. Strongly recommended for prospective teachers of Spanish.—I, II, III. Bradley

114N. Contrastive Analysis of English and Spanish (4)
Lecture—3 hours; extensive writing. Prerequisite: Linguistics 1 and course 24 or 33, or consent of instructor; courses 111N and 112N recommended. Contrastive analysis of English and Spanish, error analysis, introduction to structuralist and transformational linguistics. Individual and group conferences. (Former course 137.)—III. (III.) Colombi, Ojeda

115. History of the Spanish Language (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24 or 24S or 33 and Linguistics 1 or consent of instructor. The Spanish language from its roots in spoken Latin to modernity. Emphasis on the close relationship between historical events and language change, and the role that literature plays in language standardization. Not open for credit to students who have completed course 115S.—I, II. (I, II.) Blake

115S. History of the Spanish Language (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24 or 33 and Linguistics 1 or consent of instructor. The Spanish language from its roots in spoken Latin to modernity. Emphasis on the close relationship between historical events and language change, and the role that literature plays in language standardization. Offered in a Spanish-speaking country under the supervision of a UC Davis faculty/lecturer. Not open for credit to students who have completed course 115.—III.

116. Applied Spanish Linguistics (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: Linguistics 1 and course 24 or 33, or consent of instructor. Exploration of the major theoretical and practical issues concerning learning Spanish as a second language. For students interested in teaching Spanish as a career.—I, II. (I, II.) Blake, Colombi

117. Teaching Spanish as a Native Tongue in the U.S.: Praxis and Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Linguistics 1 and course 24, 24S or 33 or consent of the instructor. Designed for students interested in teaching Spanish to native speakers. Focus on cultural diversity of the Spanish speaking population in the United States; applied language teaching methodologies in the context of teaching Spanish to native speakers at different levels. Offered in alternate years.—I, II, III. Colombi

118. Topics in Spanish Linguistics (4)
Lecture—3 hours; term paper. Prerequisite: courses 111 and 112. A study of specialized topics in Spanish linguistics, for example: language and use; text and context; language and society; bilingualism; Spanish dialectology; syntax and semantics. May be repeated one time for credit when topic differs.—III. (III.)

123. Creative Writing in Spanish (4)
Discussion—4 hours. Prerequisite: course 24 or 33, or consent of instructor. Intensive writing of poetry or fiction in Spanish or in a bilingual (Spanish/English) format. Students will write both in prescribed forms and in experimental forms of their own choosing. Offered in alternate years.—(III.) Alarcón

130. Survey of Spanish Literature to 1700 (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Survey of Spanish literature (narrative, poetry and drama) to 1700, Emphasis on the multicultural birth of the Spanish culture, the formation and growth of the Spanish language and letters through its written records and the literature of the early period.—I. (I.) Armistead, Martín

131N. Survey of Spanish Literature: 1700 to Present (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Survey of modern Spanish literature, providing an overview of main literary movements (romanticism, realism, naturalism, modernism, avant-garde). Emphasis on the philosophical and historical background and on the European context for modern Spanish literature. (Part of former courses 104A and 104B.)—II. (II.) Altisent

132. Golden Age Drama and Performance (4)
Lecture—1.5 hours; performance instruction—1.5 hours. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Golden Age drama: text and performance. Study of Spanish Baroque drama as performance art. Close reading of plays and related aspects of seventeenth-century theater: theatrical spaces, staging, performance, actors, public, language, costumes. Final project is performance of a play. May be repeated two times for credit. Limited enrollment. Offered in alternate years.—II, III. Martín

133N. Golden Age Literature of Spain (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Introduction to the study of the principal authors and literary movements of 16th- and 17th-century Spain and Spanish American colonial literature. May be repeated three times for credit with consent of instructor.—II. (II.) Martín

134A. Don Quijote I (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Critical interpretation of Don Quijote Part One by Cervantes. Focused study of key elements within the socio-cultural context of Golden Age Spain. Don Quijote as prototype for the modern novel. Offered in alternate years.—(I, II.) Martín

134B. Don Quijote II (4)
Lecture—3 hours; term paper. Prerequisite: course 134A. Critical interpretation of Don Quijote Part Two by Cervantes. Focused study of key elements within the socio-cultural context of Golden Age Spain. Don Quijote as prototype for the modern novel. Offered in alternate years.—II, III. Martín

135N. Spanish Romanticism (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Romanticism as a philosophical concept, and as a literary movement in Spain, with emphasis on its distinctive, specific "romantic" qualities and its literary expression in five leading authors of the early nineteenth century. (Former course 114.)—III. (III.) Altisent

136N. The Spanish Novel of the 19th Century (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Literary realism in Spain, focusing on Leopoldo Alas (Clarín), Emilia Pardo Bazán and Benito Pérez Galdós unique characteristics of Spanish realism and its historical roots in Cervantes and the picaresque.—II. (II.) Altisent

137N. Twentieth-Century Spanish Fiction (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Study of the main literary trends and authors of the modern Spanish novel and short story. Selected works by Unamuno, Valle-Inclán, Sender, Cela, Matute, Ayala and others.—III. (III.) Altisent

138N. Modern and Contemporary Spanish Poetry (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Study of the main literary trends and authors of modern and contemporary Spanish poetry. Selected works by Machado, Juan Ramón Jiménez, García Lorca, Guillén, Aleixandre, Hernández Hierro and others. (Former course 120C.) Offered in alternate years.—(III.) Altisent

139. Modern Spanish Theater (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Study of the main dramatic trends and playwrights of modern Spanish theater. Selected works by Valle Inclán, García-Lorca, Mihura, Buero-Vallejo, Arrabal and others. Offered in alternate years. GE credit: ArtHum, Div.—I. (I.) Altisent

140N. Modern Spanish Essay (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Ortega, Unamuno and the modern Spanish essay. Their concept of Spain and their relations with other movements and thinkers.—II. (II.) Altisent

141. Introduction to Spanish Culture (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24, 24S, or 33. Introduction to history, geography and culture of Spain. Art, history of ideas, and everyday cultural manifestations. Introduction to critical reading and textual analysis. Not open for credit to students who have completed course 141S. GE credit: ArtHum, Div.—I. (I.) González, Martínez-Carazo

141S. Introduction to Spanish Culture (4)
Lecture—3 hours; extensive writing or discussion—1 hour. Prerequisite: course 24, 24S, or 33. Introduction to history, geography and culture of Spain. Art, history of ideas, and everyday cultural manifestations. Introduction to critical reading and textual analysis. Offered in a Spanish speaking country

under the supervision of UC Davis faculty. Not open for credit to students who have completed course 141. GE credit: ArtHum, Div.—III. (III.) Martínez-Carazo

142. Special Topics in Spanish Cultural and Literary Studies (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Special topics in the study of Spanish literature and culture. May be repeated two times for credit.—I, II, III. (I, II, III.) Altisent, Armistead, González, Martín, Martínez-Carazo

143. Spanish Art (4)
Lecture—3 hours; term paper or discussion—1 hour. Spanish art and the different historical, sociological and political manifestations that frame it. History of art, including Paleolithic, Roman, Visigothic, Romanesque, Goth, Renaissance, Baroque, Neoclassic and Contemporary art. GE credit: ArtHum—IV. (IV.) Martínez-Carazo

144. Topics in Spanish Cultural Studies (4)
Lecture—3 hours; project. Prerequisite: course 24, 24S, or 33. Study of specific historical tendencies in Spanish culture(s) from the Romans to the present. Sources studied may include literature, film, art, journalism, and performance. Approaches to material may address issues of aesthetics, politics, identity, and globalization. May be repeated one time for credit. GE credit: ArtHum.—I. (I.) González, Martínez-Carazo

147. Anglos, Latinos and the Spanish Black Legend: The Origins and Educational Implications of Anti-Hispanic Prejudice (4)
Lecture—3 hours; field work; term paper. Prerequisite: upper-division standing or consent of instructor. Examination of Anti-Hispanic prejudice in the United States focusing on the "Black Legend," a 16th Century anti-Spanish myth underpinning the doctrine of "Manifest Destiny." Exploration of the Legend's presence in contemporary American society through interviews and analysis of school textbooks. (Same course as Education 147.) GE credit: ArtHum, Div, Wrt.—González

148. Cinema in the Spanish-Speaking World in Translation (4)
Lecture—3 hours; film viewing—3 hours. Prerequisite: course 24 or 24S or 33. Analysis of the culture of the Spanish-speaking world through film in translation. Emphasis on the cultural information illustrated by the films; no prior knowledge of cinematography required. Films with subtitles. Not open for credit to students who have completed Spanish 148S. GE credit: ArtHum, Div.—II. (II.) Martinez-Carazo

148S. Cinema in the Spanish-Speaking World in Translation (4)
Lecture—3 hours; film viewing—3 hours. Prerequisite: course 24 or 33. Analysis of the culture of the Spanish-speaking world through film in translation. Emphasis on the cultural information illustrated by the films; no prior knowledge of cinematography required. Films with subtitles. Offered in a Spanish speaking country, in Spanish, under the supervision of UC Davis faculty. Not open for credit to students who have completed course 148. GE credit: ArtHum, Div.—III. (III.) Martínez-Carazo

149. Latin-American Literature in Translation (4)
Lecture/discussion—3 hours; term paper. Prerequisite: English 3 or the equivalent. Reading, lectures and discussions in English of works by Borges, Cortázar, Fuentes, García Márquez, Paz and others. May not be counted toward the major in Spanish. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—(III.) Egan

150N. Survey of Latin American Literature to 1900 (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Latin American literature from preconquest texts and the chronicles of the Conquest to romanticism and modernism. Reading selections include fiction, poetry, drama and essays.—I. (I.) Bernucci, Egan

151. Survey of Latin American Literature 1900 to Present (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Latin American literature from 1900 to the present. Reading selections include fiction, poetry, drama, essays, testimonio, etc.—II. (II.) Bejel, Irwin, Egan, Lazzara, Peluffo

151N. Survey of Spanish-American Literature 1900 to Present (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Spanish-American literature from Modernism to the present. Reading selections include fiction, poetry, drama, and essays. (Former course 105B.)—II. (II.) Egan, Bejel

153. Latin American Short Story (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. The evolution of the Latin American short story from the 19th century to the present. Emphasis on the contemporary period. Offered in alternate years.—(I.) Egan, Peluffo

154. Latin American Novel (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Evolution of the Latin American novel from the 19th century to the present. Emphasis on significant contemporary works. Offered in alternate years.—(II.) Bejel, Bernucci, Egan

155. Mexican Novel (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Evolution of the Mexican novel from the 19th century to the present. Emphasis on the narrative of the Revolution and significant contemporary works.—II. (II.) Egan

156. Latin American Literature of the Turn of the 20th Century (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Modernism as an authentic expression of Latin American literature and its influence on 20th-century poetry and prose. In depth analysis of the works of Darío and other major writers of the era. Offered in alternate years.—(II.) Egan, Peluffo

157. Great Works of Latin American Literature/Culture (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Study of major works of Latin American literature/culture and their cultural and literary milieus. May include novels, poetry, film, etc. Works may be analyzed in terms of style, influence, cultural significance, political importance, and/or commercial success. Offered in alternate years.—III. Bejel, Bernucci, Egan, Irwin, Lazzara, Peluffo

158. Latin American Poetry: From Vanguardism to Surrealism and Beyond (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Study of vanguardism, surrealism, and more recent movements of Latin American poetry. An in-depth analysis of the works of such major poets as Neruda, Vallejo, and Paz. Offered in alternate years.—(II.) Bejel, Bernucci, Egan

159. Special Topics in Latin American Literature and Culture (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Special topics in the study of Latin American literature and culture. May be repeated two times for credit when topic differs. Offered in alternate years.—I, II, III, IV. (I, II, III, IV.) Bejel, Bernucci, Egan, Irwin, Lazarra, Peluffo

159S. Special Topics in Latin American Literature and Culture (4)
Lecture—3 hours; term paper. Prerequisite: course 100, 100S, 141, 141S, 170 or 170S. Special topics in the study of Latin American literature and culture. Offered in a Spanish speaking country under the supervision of UC Davis faculty. May be repeated two times for credit when topic differs.—III. (III.) Lazzara, Peluffo

160. Latin American Women Writers in Translation (4)
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Latin American women writers from the 19th and 20th centuries. Recent theoretical approaches to literature by women in Latin America. Discussions in English of works by Matto de Turner, Avellaneda, Storni, Ocampo, Agustini, Mistral, Castellanos, and others. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—III. (III.) Peluffo

170. Introduction to Latin American Culture (4)
Lecture—3 hours; term paper. Prerequisite: course 24, 24S or 33. Introduction to history, geography and culture of Latin America. Multiple genres of cultural production and representation, with a focus on cultural diversity and regional difference. Introduction to critical reading and textual analysis. Not open for credit for students who have completed course 170S. GE credit: ArtHum, Div.—III. (III.) Bejel, Irwin, Lazzara, Peluffo

170S. Introduction to Latin American Culture (4)
Lecture—3 hours; project. Prerequisite: course 24, 24S or 33. Introduction to history, geography and culture of Latin America. Multiple genres of cultural production and representation, with a focus on cultural diversity and regional difference. Introduction to critical reading and textual analysis. Not open for credit for students who have completed course 170. GE credit: ArtHum, Div.—III. (III.) Colombi, Lazzara, Peluffo

171. Music from Latin America (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Examination of music from Latin America. Characteristic music (i.e., tango, bossa nova, salsa, música motena, musica andina) as well as its implications in other musical genres. Taught in Spanish. Not open to students who have taken course 171S or Music 127. (Same course as Music 171.) Offered in alternate years.—II.

171S. Music from Latin America (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Examination of music from Latin America. Characteristic music (i.e., tango, bossa nova, salsa, musica motena, música andina) as well as its implications in other musical genres. Taught in Spanish and in a Spanish speaking country under the supervision of UC Davis faculty. Not open to students who have taken course 171 or Music 127.—II. (II.)

172. Mexican Culture (4)
Lecture—3 hours; term paper or discussion—1 hour or term paper. Prerequisite: course 24, 24S or 33. Study of Mexican culture through a diversity of cultural expression, including elite, popular and mass media culture. Focus on national icons and archetypes, multiculturalism, transnationalism. May be repeated once for credit. GE credit: ArtHum, Div.—III. (III.) Egan, Irwin

173. Cinema and Latin American Culture (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 24, 24S, or 33. Understanding Latin American cultures through cinema. History and critical analysis of Latin American film. Focus on a national cinematic tradition. Comparative experiences in different parts of Latin America and/or a particular era. Conducted entirely in Spanish. May be repeated one time for credit. GE Credit: ArtHum, Div.—Irwin

174. Chicano Culture (4)
Lecture—3 hours; term paper/discussion—1 hour. Prerequisite: course 24 or 33. An interdisciplinary survey of Chicano culture. Topics include literature, art, folklore, oral tradition, music, politics, as well as everyday cultural manifestations. Conducted in Spanish. (Former course 124.) GE credit: ArtHum, Div.—II. (II.) Alarcón

175. Topics in Spanish American Cultural Studies (4)
Lecture—3 hours; project—1 hour. Prerequisite: course 24, 24S, or 33. Specific historical tendencies and issues in Latin American culture(s) from precolombian times to present. Studies of literature, film, art, journalism and performance. Focus on issues of aesthetics, politics, identity, and globalization. May be repeated once for credit if content differs. GE credit: ArtHum, Div.—III. (III.) Bejel, Irwin, Lazzara, Peluffo

176. Literature in Spanish Written in the United States (4)
Lecture—3 hours; term paper. Prerequisite: course 24 or 33. Survey of the literary and cultural contributions of the main Spanish-speaking populations present in the U.S.: Chicanos, Puerto Ricans, Cuban-Americans, Central Americans, and other Latinos. GE credit: ArtHum, Div.—III. (III.) Alarcón

177. California and Latin America (4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: course 24, 24S or 33. Interdisciplinary survey on the relationship between California and Latin America (1500s-present). Latin American representations of California and Californian representations of Latin America, as well as borderlands texts, with a special focus on Mexican-American perspectives. Conducted in Spanish.—Irwin

180. Senior Seminar in Spanish Linguistics (4)
Seminar—3 hours; term paper. Prerequisite: senior standing; a major in Spanish or consent of instructor. Group study of a special topic drawn from Spanish linguistics. Limited enrollment. May be repeated one time for credit.—I. (I.) Blake, Bradley, Colombi

181. Senior Seminar in Spanish Literature/ Culture (4)
Seminar—3 hours; term paper—1 hour. Prerequisite: senior standing; a major in Spanish or consent of instructor. Group study of a special topic drawn from Spanish literary or cultural studies. Independent research project. May be repeated one time for credit if content differs. Limited enrollment.—II. (II.) Altisent, Armistead, González, Martin, Martínez-Carazo

182. Senior Seminar in Latin American Literature/Culture (4)
Seminar—3 hours; term paper—1 hour. Prerequisite: senior standing; a major in Spanish or consent of instructor. Group study of a special topic drawn from Latin American literary or cultural studies. Independent research project. May be repeated one time for credit if content differs. Limited enrollment.—III. (III.) Bejel, Egan, Irwin, Lazzara, Peluffo

192I. Internship in Spanish (1-12)
Independent study—3-36 hours. Prerequisite: course 23; junior standing; major in Spanish, Chicano Studies, or a related field. Internships in fields where Spanish language skills can be used and perfected (teaching, counseling, translating-interpreting). May be repeated for credit for a total of 8 units. Units will not count toward the Spanish major. (P/NP grading only.)

194H. Special Study for Honors Students (1-5)
Independent Study—3-15 hours. Prerequisite: Senior standing and qualification for the Spanish honors program. Guided research, under the direction of a faculty member, leading to a senior honors thesis on a topic in Spanish literature, civilization, or language studies. May be repeated for up to 8 units of credit. (P/NP grading only.)

197T. Tutoring in Spanish (1-4)
Tutorial—1-4 hours. Prerequisite: upper division standing and permission of the chair. Tutoring in undergraduate courses including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit for a total of 6 units. (P/NP grading only.)

197TC. Tutoring in the Community (2-4)
Tutorial—2-4 hours. Prerequisite: upper division standing and permission of the chair. Tutoring in public schools under the guidance of a regular teacher and supervision by a departmental faculty member. May be repeated for credit for a total of 6 units. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
May be repeated for up to 6 units of credit (P/NP grading only.)

Graduate Courses

201. Literary Theory I (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Basic theories and practical approaches to modern and contemporary Hispanic literature. Emphasis on formalism, poststructuralism, socio-cultural discourses, and ideologies.—II. (II.) Bejel

202. Literary Theory II (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Major contemporary critical theories including recent, innovative approaches to Hispanic literature and culture. Readings from Semiotics and Deconstructionism to Psychological and Socio-ideological approaches. Emphasis on Postmodern and Neo-colonial discourse.—III. (III.) Bejel

203. Research Methodologies (1)
Seminar—1 hour. Introduction to the range of scholarly research methodologies currently being realized in Spanish linguistics, literary and cultural studies: archival research, textual analysis, discourse analysis, statistics for linguistics, etc.; introduction to scholarly writing (MLA style) and scholarly publishing.—II. (II.) Altisent, Bejel, Bernucci, Blake, Colombi, Egan, Irwin, Lazzara, Martin, Martinez-Carazo, Newcomb, Peluffo

205. Spanish Phonology (4)
Seminar—3 hours; term paper. Prerequisite: some knowledge of phonetics is required and consent of instructor; Linguistics 109 and 139 highly recommended. Analyzes the sound patterns of Spanish from both linear and non-linear perspectives. Students will develop a clear understanding of what phonology is and the nature of Spanish phonology, as defined by modern linguistic analysis.—II. (II.)

206. Spanish Syntax (4)
Seminar—3 hours; term paper. Prerequisite: Linguistics 140 and 165. An examination of Spanish word order within the framework of general linguistic theory. The student will investigate how to write a grammar of Spanish with particular attention to the structure of noun and verb clauses.—I. (I.) Blake, Ojeda

207. History of the Spanish Language (4)
Seminar—3 hours; term paper. Prerequisite: Latin 1. (Former course 220A.)—I, III. (I, III.) Blake

208. Old Spanish Texts (4)
Seminar—3 hours; term paper. Prerequisite: course 207. An in-depth linguistic examination of Old Spanish texts from the 12th to the 15th centuries, with particular attention to the significance of orthographic changes.—II. (II.) Blake

211. Hispanic Dialectology (4)
Seminar—3 hours; term paper. Prerequisite: course 220 or consent of instructor. Descriptive and historical study of the distinctive features of Peninsular and American Spanish dialects. (Former course 221.)—III. (III.)

212. Applied Linguistics (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing and courses 215 and 216 recommended. Focuses on the relevant linguistic aspects of teaching Spanish. Designed for graduate students who have an interest in second-language learning and teaching.—II. (II.) Colombi, Blake

215. Special Topics in Hispanic Linguistics (4)
Seminar—3 hours; term paper. Prerequisite: consent of instructor; courses 205 and 206 recommended. Specialized topics in Hispanic linguistics (e.g., pragmatics, sociolinguistics, topics in syntax, semantics, or diachronic studies). May be repeated for credit when topic differs.—III. (III.)

222. Critical Approaches to Spanish Literature I: Prose and Essay (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Critical approaches to Spanish narrative and essay. May be repeated two times for credit when topic differs. Offered in alternate years.—II. Altisent, Armistead, Martín

223. Critical Approaches to Spanish Literature II: Poetry and Drama (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Critical approaches to Spanish poetry and drama. May be repeated two times for credit when topic differs. Offered in alternate years.—II. Altisent, Armistead, Martín

224. Studies of a Major Writer, Period, or Genre in Spanish Literature (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Artistic development of a major Spanish writer and his/her intellectual and literary milieu or study of a special topic, period, or genre. May be repeated for credit with consent of instructor.—III. (III.)

230. Topics in Latin American Cultural Studies (4)
Seminar—3 hours; term paper. Discussion of select contemporary theoretical debates in Latin American Cultural Studies. Application of critical questions to the analysis of cultural texts. May be repeated two times for credit when topic differs. Offered in alternate years.—(II.) McKee

231. Interamerican Studies (4)
Seminar—3 hours; term paper. Survey of methodologies of investigation for crosscultural or comparative projects in the geographical context of the Americas. Focus on particular problems of language, discipline, national definitions, and global hierarchies of knowledge that complicate such projects. Readings of interamerican cultural texts. Offered in alternate years.—(II.) McKee

252. Medieval Spanish Literature: Prose (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. An exploration of the major genres of Medieval Spanish prose from its origins to 1450.—I. (I.) Armistead

253. Medieval Spanish Literature: Epic (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Medieval Spanish epic narratives. Major theoretical perspectives on the genesis, diffusion, and character of the Medieval epic. Relationship of epic to ballad literature.—II. (II.) Armistead

254. Medieval Hispanic Lyric (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Analysis of the most representative lyric poetry in the various Peninsular languages and in provencal, troubadour poetry, kharjas, villancicos, cantigas de amigo, and courtly lyric.—II. (II.) Armistead

255. Spanish Literature of the Early Renaissance (4)
Seminar—3 hours; term paper. Spanish Literature, 1450-1550, with emphasis on La Celestina. (Former course 229.)—I. (I.) Armistead, Martín

256. Spanish Literature of the Renaissance and Golden Age: Poetry (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Extensive critical study of the main currents of Renaissance and Baroque Spanish poetry through its language structures, styles ("Culteranismo-Conceptismo"), rhetorical devices, myths, and themes (love, death, time).—I. (I.) Martín

257. Spanish Literature of the Renaissance and Golden Age: Drama (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. An exploration of major 16th and17th century literary and cultural developments through the study of selected dramas.—I. (I.) Martín

258. Spanish Literature of the Renaissance and Golden Age: Prose (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The origins and development of the Spanish novel during the Renaissance and the Spanish Golden Age.—I. (I.) Martín

259. Cervantes and the Novel (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The narrative works of Miguel de Cervantes with special emphasis on Don Quijote.—I. (I.) Martín, Armistead

260. Modern Spanish Literature (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics of Spanish literature, from 1700-1920.—I. (I.)

261. Contemporary Spanish Literature: Poetry (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Critical analysis of modern Spanish poetry from a wide spectrum of poetic currents.—I. (I.) Altisent

262. Contemporary Spanish Literature: Narrative (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the 20th-century novel and short story with emphasis on the avant-garde, existentialism, social realism, and postmodern trends. May be repeated two times for credit when topic differs and with consent of instructor.—III. Altisent

263. Contemporary Spanish Literature: Drama (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. The Spanish theatrical production of the last 70 years.—I. (I.) Altisent

264. Contemporary Spanish Literature: Essay (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Major thinkers from Ganivet to Unamuno and Ortega y Gassett. Emphasis will be placed on the relationships between Spanish thought and European philosophical currents. Offered in alternate years.—(III.)

265. Women Writers of Spain (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Introduction to the development of a feminine consciousness in the Spanish contemporary literary scene. Selected texts represent particularly innovative typologies of feminine discourse in the realm of the historical, psychoanalytical, and metafictional, erotic, and allegorical fiction.—I. (I.) Altisent

272. Critical Approaches to Latin American Literature: Narrative (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Development of Latin American literary periods and currents in narrative (novel, short story, and essay), from early colonial times to the present. May be repeated two times for credit. if material changes. Offered in alternate years.—I. Bejel, Bernucci, Egan, Lazzara, Peluffo

273. Critical Approaches to Latin American Literature: Poetry and Drama (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Development of Latin American literary periods and currents in poetry and drama, from early Colonial times to the present. May be repeated two times for credit when topic differs. Offered in alternate years.—I. Bejel, Bernucci, Egan

274. Studies of a Major Writer, Period, or Genre in Latin American Literature (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Artistic development of a major Latin American writer and his/her intellectual and literary milieu or study of a special topic, period, or genre. May be repeated for credit.—I. (I.) Bejel, Bernucci, Egan, Irwin, Lazzara, Peluffo

275. Colonial Literature (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing and consent of instructor. An examination of pre-Hispanic and Colonial narrative, poetry and theatre. Emphasis on historical, anthropological, and ethnographic approaches to Colonial discourse.—I. (I.) Egan

276. Twentieth-Century Latin American Drama (4)
Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Major Latin American dramatists from Florencio Sánchez to the present. Offered in alternate years. (Former course 240.)—(III.) Egan

277. Latin American Novel, 1900-1950 (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of main trends and key authors in Latin America in the first half of the 20th century. Offered in alternate years. (Former course 241A.)—(I.) Bernucci, Egan

278. New Trends in Latin American Fiction (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Recent developments in Latin American narrative. Emphasis on innovative language and structure. Offered in alternate years. (Former course 241B.)—(II.) Egan, Lazzara

279. Mexican Narrative (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the evolution of Mexican narrative. Emphasis on the narrative of the Revolution and significant contemporary works. Offered in alternate years.—(III.) Egan

280. Latin American Short Story (4)
Seminar—3 hours; term paper. Works by major writers with emphasis on 20th-century authors such as Quiroga, Borges, García Márquez, Cortázar, and Rulfo. (Former course 243.)—III. (III.) Bernucci, Egan

281. Latin American Women Writers (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of feminist critical theories, gender construction, and self-representation within the history of socio-cultural changes in Latin America.—I. (I.) Peluffo

282. Darío and Modernism (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of poetry and prose of Spanish-American Modernism (1880-1916). Offered in alternate years. (Former course 245.)—(I.) Egan

283. New Directions in Latin American Poetry (4)
Seminar—3 hours; term paper. New trends in Latin American poetry. Offered in alternate years.—(III.) Egan

284. The Latin American Essay (4)
Seminar—3 hours; term paper. Major Latin American essayists from Sarmiento to contemporary essayists. Offered in alternate years.—(II.) Irwin

285. Multicultural Approaches to Cuban Literature and Culture (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of main trends in Cuban literature. Emphasis on historical, geographic, social and cultural context (including music and film). Course taught in English with some readings in Spanish.—III. (III.) Bejel

291. Foreign Language Learning in the Classroom (4)
Seminar—3 hours; project. Overview of approaches to university-level foreign language instruction and the theoretical notions underlying current trends in classroom practices across commonly taught foreign languages. (Same course as French 291 and German 291.)—I, II. (I, II.) Anderson, Arnett, Blake, Iwasaki

298. Group Study (1-5)
Prerequisite: graduate standing and consent of instructor. May be repeated for credit. (S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Courses

390. The Teaching of Spanish in College (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of graduate teaching assistants.—I. (I.) López-Burton

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Statistics

(College of Letters and Science)

Wolfgang Polonik, Ph.D., Chairperson of the Department

Department Office. 4118 Mathematical Sciences Building
(530) 752-2362; *http://www-stat.ucdavis.edu*

Faculty

Alexander Aue, Ph.D., Assistant Professor
Prabir Burman, Ph.D., Professor
Christiana Drake, Ph.D., Professor
Peter Hall, Ph.D., Professor
Fushing Hsieh, Ph.D., Professor
Jiming Jiang, Ph.D., Professor
Thomas Lee, Ph.D., Professor
Hans-Georg Müller, M.D., Ph.D., Professor
Debashis Paul, Ph.D., Assistant Professor
Jie Peng, Ph.D., Associate Professor
Wolfgang Polonik, Ph.D., Professor
George G. Roussas, Ph.D., Professor
Francisco J. Samaniego, Ph.D., Professor
Academic Senate Distinguished Teaching Award
Rituparna Sen, Ph.D., Assistant Professor
Duncan Temple Lang, Ph.D., Associate Professor
Jane-Ling Wang, Ph.D., Professor

Emeriti Faculty

Rudolph Beran, Ph.D., Professor Emeritus
P.K. Bhattacharya, Ph.D., Professor Emeritus
Alan P. Fenech, Ph.D., Professor Emeritus
Yue-Pok (Ed) Mack, Ph.D., Professor Emeritus
Robert H. Shumway, Ph.D., Professor Emeritus
Alvin D. Wiggins, Ph.D., Professor Emeritus

Affiliated Faculty

Rahman Azari, Ph.D., Lecturer

The Major Program

Statistics enables us to make inferences about entire populations, based on samples extracted from those populations. Statistical methods can be applied to problems from almost every discipline and they are vitally important to researchers in agricultural, biological, environmental, social, engineering, and medical sciences.

The Program. Statistics majors may receive either a Bachelor of Arts or a Bachelor of Science degree (. The B.S. degree program has three options: General Statistics, Applied Statistics, and Computational Statistics. Both the A.B. and the B.S. degree programs require theoretical and applied course work and underscore the strong interdependence of statistical theory and the applications of statistics.

General Option in Statistics (BS) emphasizes statistical theory and is especially recommended as preparation for graduate study in statistics.

Applied Statistics Options (A.B. and B.S.) emphasize statistical applications. These programs are recommended for students who do not plan to pursue graduate studies in statistics and those who are interested in combining the statistics study with a second major or minor program in the social and life sciences.

Computational Statistics Option (B.S.) emphasizes computing. This major is recommended for students interested in the computational and data management aspects of statistical analysis.

Career Alternatives. Probability models and statistical methods are used in a great many fields, including the biological and social sciences, business and engineering. The wide applicability of statistics has created in both the public and private sectors a strong demand for graduates with statistical training. Employment opportunities include careers in data and policy analysis in government, financial management, quality control, insurance and health care industry, actuarial work, engineering, public health, biological research, and education. Some students have entered advanced studies in statistics, economics, psychology, medicine and other professional school programs.

A.B. Major Requirements:

UNITS

Preparatory Subject Matter..... 25

Mathematics 21A, 21B, 21C 12
Mathematics 22A, 22B..... 6
Computer Science Engineering 30 or Computer Science Engineering 40 (or the equivalent) 4
Statistics 32..... 3

Depth Subject Matter 41-44

Statistics 106, 108 or the equivalent 8
Statistics 131A, 131B, 131C 12
Three courses from Statistics 104, 135, 137, 138, 141, 142, 144, 145..... 12
Related elective courses 9-12
Three upper division courses approved by major adviser; they should be in mathematics, computer science or in quantitative aspects of a substantive discipline.

Total Units for the Major 66-69

B.S. Major Requirements:

General Statistics option

UNITS

Preparatory Subject Matter..... 30-32

Mathematics 21A, 21B, 21C, 21D 16
Mathematics 22A or 67..... 3-4
Mathematics 25..... 4
Computer Science Engineering 30 or Computer Science Engineering 40 (or the equivalent) 4
Any one introductory statistics course except Statistics 10..... 3-4

Depth Subject Matter 51-52

Statistics 106, 108, 138..... 12
Statistics 131A, 131B, 131C 12
Three courses from Statistics 104, 135, 137, 141, 142, 144, 145..... 12
Mathematics 125A, 108 or 125B, and 167..... 12
Related elective courses 3-4
One upper division course approved by major adviser; it should be in mathematics, computer science or in quantitative aspects of a substantive discipline.

Total Units for the Major 81-84

Applied Statistics option

UNITS

Preparatory Subject Matter..... 26-31

Mathematics 16A, 16B, 16C; or 17A, 17B, 17C; or 21A, 21B, 21C (21 series recommended)..... 9-12
Mathematics 22A..... 3
Computer science Engineering 30 or Computer Science Engineering 40 (or the equivalent) 4
Two introductory courses serving as the prerequisites to upper division courses in a chosen discipline to which statistics is applied.....7-8
Any one introductory statistics course except Statistics 10 3-4

Depth Subject Matter 51-56

Statistics 106, 108, 138, 141..... 16
Statistics 130A, 130B 8
Three courses selected from Statistics 104, 135, 137, 142, 144, 145 12
Five upper division elective courses outside of Statistics.....15-20
The electives are chosen with and must be approved by the major advisor. The electives should follow a coherent sequence in one single disciple where statistical methods and models are applied: at least three of them should cover the quantitative aspects of the discipline.

Total Units for the Major 77-87

Computational Statistics option

UNITS

Preparatory Subject Matter..... 30-31

Mathematics 21A, 21B, 21C, 21D..... 16
Mathematics 22A 3
Computer Science Engineering 30 and 40 8
Any one introductory statistics course except Statistics 10 3-4

Depth Subject Matter 52

Statistics 106, 108, 141..... 12
Statistics 131A, 131B 8
Two courses from Statistics 104, 135, 137, 138, 142, 144, 145 8
Programming, Data Management & Data Technologies: Computer Science Engineering 110 or 145; and 165A or 166..... 8
Two courses on Scientific Computational Algorithm and Visualization from: Computer Science Engineering 122A, 129, 140A, 158, 163 8
Two courses from Mathematics 124, 128A, 128B, 129, 145, 148, 160, 165, 167, 168 8

Total Units for the Major 82-83

Major Adviser. C. Drake

Students are encouraged to meet with an adviser to plan a program as early as possible. Sometime before or during the first quarter of the junior year, students planning to major in Statistics should consult with a faculty adviser to plan the remainder of their undergraduate programs.

Minor Program Requirements:

The Department offers a minor program in Statistics that consists of a survey at the upper division level of the fundamentals of mathematical statistics and of the most widely used applied statistical methods.

UNITS

Statistics 20

Statistics 106, 108, and 130A-130B or 131A-131B..... 16
One course from Statistics 104, 135, 137, 138, 141, 142, 144, 145 4
Preparation. Statistics 13 or 32 or 100 or 102.

Graduate Study. The Graduate Program in Statistics offers study and research leading to the M.S. and Ph.D. degrees in Statistics, including a Ph.D. in Statistics with an emphasis in Biostatistics. Detailed information concerning these degree programs, as well as information on admissions and on financial support, is available from the Department of Statistics.

Graduate Adviser. P. Burman

Statistical Consulting. The Department provides a consulting service for researchers on campus. For more information, call the Statistical Laboratory office (530) 752-6096.

Courses in Statistics (STA)

Lower Division Courses

10. Statistical Thinking (4)

Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: two years of high school algebra. Statistics and probability in daily life. Examines principles of collecting, presenting and interpreting data in order to critically assess results reported in the media; emphasis is on understanding polls, unemployment rates, health studies; understanding probability, risk and odds. GE credit: SciEng or SocSci, Wrt.—III. (III.)

12. Introduction to Discrete Probability (4)

Lecture—3 hours; laboratory—1 hour. Prerequisite: two years of high school algebra. Random experiments; countable sample spaces; elementary probability axioms; counting formulas; conditional probability; independence; Bayes theorem; expectation; gambling problems; binomial, hypergeometric, Poisson, geometric, negative binomial and multinomial models; limiting distributions; Markov chains. Applications in the social, biological, and engineering sciences. Offered in alternate years. GE credit: SciEng.

13. Elementary Statistics (4)

Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra or the equivalent in college. Descriptive statistics; basic probability concepts; binomial, normal, Student's t, and chi-square distributions. Hypothesis testing and confidence intervals for one and two means and proportions. Regression. Not open for credit to students who have completed course 13V or higher. GE credit: SciEng.—I, II, III. (I, II, III.)

13V. Elementary Statistics (4)

Lecture—1.5 hours; web virtual lecture—5 hours. Prerequisite: two years of high school algebra or the equivalent in college. Descriptive statistics; basic probability concepts; binomial, normal, Student's t, and chi-square distributions. Hypothesis testing and confidence intervals for one and two means and proportions. Regression. Not open for credit to students who have completed course 13 or higher. GE credit: SciEng.—I. (I.)

32. Basic Statistical Analysis Through Computers (3)

Lecture—3 hours. Prerequisite: Mathematics 16B or 21B; ability to program in a high-level computer language such as Pascal. Overview of probability modeling and statistical inference. Problem solution through mathematical analysis and computer simulation. Recommended as alternative to course 13 for students with some knowledge of calculus and computer programming. GE credit: SciEng.—II, III. (II, III.)

90X. Seminar (1-2)

Seminar—1-2 hours. Prerequisite: high school algebra and consent of instructor. Examination of a special topic in a small group setting.

98. Directed Group Study (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)

Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Applied Statistics for Biological Sciences (4)

Lecture—3 hours; laboratory—1 hour. Prerequisite: Mathematics 16B or the equivalent. Descriptive statistics, probability, sampling distributions, estimation, hypothesis testing, contingency tables, ANOVA, regression; implementation of statistical methods using computer package. Only two units credit allowed to students who have taken course 13, 32 or 103. Not open for credit to students who have taken course 102. GE credit: SciEng.—I, II, III. (I, II, III.)

102. Introduction to Probability Modeling and Statistical Inference (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: two years of high school algebra, and upper division standing. Introductory probability and statistics at a rigorous yet precalculus level. Rigorous precalculus introduction to probability and parametric/nonparametric statistical inference with computing; binomial, Poisson, geometric, normal, and sampling distributions; exploratory data analysis; regression analysis; ANOVA. Only two units of credit allowed to students who have taken course 32. Not open for credit to students who have taken course 100. GE credit: SciEng.—I, III. (I, III.)

103. Applied Statistics for Business and Economics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32, or 102; and Mathematics 16A, 16B. Descriptive statistics; probability; random variables; expectation; binomial, normal, Poisson, other univariate distributions; joint distributions; sampling distributions, central limit theorem; properties of estimators; linear combinations of random variables; testing and estimation; Minitab computing package. GE credit: SciEng.—I, II, III. (I, II, III.)

104. Applied Statistical Methods: Nonparametric Statistics (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 13, 32, or 102. Sign and Wilcoxon tests, Walsh averages. Two-sample procedures. Inferences concerning scale. Kruskal-Wallis test. Measures of association. Chi square and Kolmogorov-Smirnov tests. Offered in alternate years. GE credit: SciEng.—(II.)

106. Applied Statistical Methods: Analysis of Variance (4)
Lecture—4 hours. Prerequisite: course 13, 32, or 102. One-way and two-way fixed effects analysis of variance models. Randomized complete and incomplete block design, Latin squares. Multiple comparisons procedures. One-way random effects model. GE credit: SciEng.—I, II. (I, II.)

108. Applied Statistical Methods: Regression Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32 or 102. Simple linear regression, variable selection techniques, stepwise regression, analysis of covariance, influence measures, computing packages. GE credit: SciEng.—I, II, III. (I, II, III.)

120. Probability and Random Variables for Engineers (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, B, C, and D. Basic concepts of probability theory with applications to electrical engineering, discrete and continuous random variables, conditional probability, combinatorics, bivariate distributions, transformation or random variables, law of large numbers, central limit theorem, and approximations. No credit for students who have completed course 131A or Civil and Environmental Engineering 114. GE credit: SciEng.—I, III. (I, III.) Mueller

130A. Mathematical Statistics: Brief Course (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics16B. Basic probability, densities and distributions, mean, variance, covariance, Chebyshev's inequality, some special distributions, sampling distributions, central limit theorem and law of large numbers, point estimation, some methods of estimation, interval estimation, confidence intervals for certain quantities, computing sample sizes. Only 2 units of credit allowed to students who have taken course 131A.—I. (I.)

130B. Mathematical Statistics: Brief Course (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130A. Transformed random variables, large sample properties of estimates. Basic ideas of hypotheses testing, likelihood ratio tests, goodness-of-fit tests. General linear model, least squares estimates, Gauss-Markov theorem. Analysis of variance, F-test. Regression and correlation, multiple regression. Selected topics.—II. (II.)

131A. Introduction to Probability Theory (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, B, C, and D. Fundamental concepts of probability theory, discrete and continuous random variables, standard distributions, moments and moment-generating functions, laws of large numbers and the central limit theorem. Not open for credit to students who have completed Mathematics 135A.—I, II, III. (I, II, III.) Mueller

131B. Introduction to Mathematical Statistics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131A or Mathematics 135A. Sampling, methods of estimation, sampling distributions, confidence intervals, testing hypotheses, linear regression, analysis of variance, elements of large sample theory and nonparametric inference.—II, III. (II, III.) Mueller

131C. Introduction to Mathematical Statistics (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131B. Sampling, methods of estimation, sampling distributions, confidence intervals, testing hypotheses, linear regression, analysis of variance, elements of large sample theory and nonparametric inference.—III. (III.) Mueller

133. Mathematical Statistics for Economists (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 103 and Mathematics 16B, or the equivalents; no credit will be given to students majoring in Statistics. Probability, basic properties; discrete and continuous random variables (binomial, normal, t, chi-square); expectation and variance of a random variable; bivariate random variables (bivariate normal); sampling distributions; central limit theorem; estimation, maximum likelihood principle; basics of hypotheses testing (one-sample).—I. (I.)

135. Multivariate Data Analysis (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B, and preferably course 131B. Multivariate normal distribution; Mahalanobis distance; sampling distributions of the mean vector and covariance matrix; Hotelling's T^2; simultaneous inference; one-way MANOVA; discriminant analysis; principal components; canonical correlation; factor analysis. Intensive use of computer analyses and real data sets.—III. (III.)

137. Applied Time Series Analysis (4)
Lecture—3 hours; term paper. Prerequisite: course 108 or the equivalent. Time series relationships, cyclical behavior, periodicity, spectral analysis, coherence, filtering, regression, ARIMA and state-space models; Applications to data from economics, engineering, medicine environment using time series software.—III. (III.)

138. Analysis of Categorical Data (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B or 131B, or courses 106 and 108. Varieties of categorical data, cross-classifications, contingency tables, tests for independence. Multidimensional tables and log-linear models, maximum likelihood estimation; tests of goodness-of-fit. Logit models, linear logistic models. Analysis of incomplete tables. Packaged computer programs, analysis of real data. GE credit: SciEng.—I. (I.)

141. Statistical Computing (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: one introductory class in Statistics (such as 13, 32, 100, or 102), or the equivalent. Organization of computations to access, transform, explore, analyze data and produce results. Concepts and vocabulary of statistical/scientific computing.—I. (I.)

142. Reliability (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 130B or 131B or consent of instructor. Stochastic modeling and inference for reliability systems. Topics include coherent systems, statistical failure models, notions of aging, maintenance policies and their optimization. Offered in alternate years.

144. Sampling Theory of Surveys (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 130B or 131B. Simple random, stratified random, cluster, and systematic sampling plans; mean, proportion, total, ratio, and regression estimators for these plans; sample survey design, absolute and relative error, sample size selection, strata construction; sampling and nonsampling sources of error. Offered in alternate years. GE credit: SciEng.—(I.)

145. Bayesian Statistical Inference (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 130A and 130B, or 131A and 131B, or the equivalent. Subjective probability, Bayes Theorem, conjugate priors, non-informative priors, estimation, testing, prediction, empirical Bayes methods, properties of Bayesian procedures, comparisons with classical procedures, approximation techniques, Gibbs sampling, hierarchical Bayesian analysis, applications, computer implemented data analysis. Offered in alternate years.—(II.)

190X. Seminar (1-2)
Seminar—1-2 hours. Prerequisite: one of courses 13, 32, 100, 102, or 103. In-depth examination of a special topic in a small group setting.

192. Internship in Statistics (1-12)
Internship—3-36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Work experience in statistics. (P/NP grading only.)

194HA-194HB. Special Studies for Honors Students (4-4)
Independent study—12 hours. Prerequisite: senior qualifying for honors. Directed reading, research and writing, culminating in the completion of a senior honors thesis or project under direction of a faculty adviser. (Deferred grading only, pending completion of sequence.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

205. Statistical Methods for Research with SAS (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: An introductory upper division statistics course and some knowledge of vectors and matrices; suggested courses are 100, or 102, or 103, or the equivalent. Focus on linear statistical models widely used in scientific research. Emphasis on concepts, methods and data analysis using SAS. Topics include simple and multiple linear regression, polynomial regression, diagnostics, model selection, variable transformation, factorial designs and ANCOVA.—III. (III.)

222. Biostatistics: Survival Analysis (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C. Incomplete data; life tables; nonparametric methods; parametric methods; accelerated failure time models; proportional hazards models; partial likelihood; advanced topics. (Same course as Biostatistics 222.)—I. (I.)

223. Biostatistics: Generalized Linear Models (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C. Likelihood and linear regression; generalized linear model; Binomial regression; case-control studies; dose-response and bioassay; Poisson regression; Gamma regression; quasi-likelihood models; estimating equations; multivariate GLMs. (Same course as Biostatistics 223.)—II. (II.)

224. Analysis of Longitudinal Data (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course/Biostatistics 222, 223 and course 232B or consent of instructor. Standard and advanced methodology, theory, algorithms, and applications relevant for analysis of repeated mea-

surements and longitudinal data in biostatistical and statistical settings. (Same course as Biostatistics 224.)—III. (III.)

225. Clinical Trials (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course/Biosatistics 223 or consent of instructor. Basic statistical principles of clinical designs, including bias, randomization, blocking, and masking. Practical applications of widely-used designs, including dose-finding, comparative and cluster randomization designs. Advanced statistical procedures for analysis of data collected in clinical trials. (Same course as Biostatistics 225.) Offered in alternate years.—III.

226. Statistical Methods for Bioinformatics (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 131C or consent of instructor; data analysis experience recommended. Standard and advanced statistical methodology, theory, algorithms, and applications relevant to the analysis of -omics data. (Same course as Biostatistics 226.) Offered in alternate years.—(II.)

231A. Mathematical Statistics I (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 131A-C, Mathematics 25 and Mathematics 125 A or equivalent. First part of three-quarter sequence on mathematical statistics. Emphasizes foundations. Topics include basic concepts in asymptotic theory, decision theory, and an overview of methods of point estimation.—I. (I.)

231B. Mathematical Statistics II (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 231A. Second part of a three-quarter sequence on mathematical statistics. Emphasizes: hyposthesis testing (including multiple testing) as well as theory for linear models.—II. (II.)

231C. Mathematical Statistics III (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 231A, 231B. Third part of three-quarter sequence on mathematical statistics. Emphasizes large sample theory and their applications. Topics include statistical functionals, smoothing methods and optimization techniques relevant for statistics.—III. (III.)

232A. Applied Statistics I (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 106, 108, 131A, 131B, 131C, and Mathematics 167. Estimation and testing for the general linear model, regression, analysis of designed experiments, and missing data techniques.—I. (I.)

232B. Applied Statistics II (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 106, 108, 131A, 131B, 131C, 232A and Mathematics 167. Alternative approaches to regression, model selection, nonparametric methods amenable to linear model framework and their applications.—II. (II.)

232C. Applied Statistics III (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: course 106, 108, 131C, 232B and Mathematics 167. Multivariate analysis: multivariate distributions, multivariate linear models, data analytic methods including principal component, factor, discriminant, canonical correlation and cluster analysis.—III. (III.)

233. Design of Experiments (3)
Lecture—3 hours. Prerequisite: course 131C. Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces. Offered in alternate years.—(III.)

235A-235B-235C. Probability Theory (4-4-4)
Lecture—3 hours; term paper or discussion—1 hour. Prerequisite: 235A—Mathematics 125B and 135A or course 131A or consent of instructor; 235B—Mathematics 235A/course 235A or consent of instructor; 235C—Mathematics 235B/course 235B or consent of instructor. Measure-theoretic foundations, abstract integration, independence, laws of large numbers, characteristic functions, central limit theorems. Weak convergence in metric spaces, Brownian motion, invariance principle. Conditional expectation. Topics selected from martingales, Markov chains, ergodic theory. (Same course as Mathematics 235A-235B-235C.)—I-II-III. (I-II-III.)

237A-237B. Time Series Analysis (4-4)
Lecture—3 hours; term paper. Prerequisite: course 131B or the equivalent; course 237A is a prerequisite for course 237B. Advanced topics in time series analysis and applications. Models for experimental data, measures of dependence, large-sample theory, statistical estimation and inference. Univariate and multivariate spectral analysis, regression, ARIMA models, state-space models, Kalman filtering. Offered in alternate years.—(I-II.)

238. Theory of Multivariate Analysis (4)
Lecture—3 hours; term paper. Prerequisite: courses 131B and 135. Multivariate normal and Wishart distributions, Hotelling's T-Squared, simultaneous inference, likelihood ratio and union intersection tests, Bayesian methods, discriminant analysis, principal component and factor analysis, multivariate clustering, multivariate regression and analysis of variance, application to data. Offered in alternate years.—II.

240A-240B. Nonparametric Inference (4-4)
Lecture—3 hours; term paper. Prerequisite: course 231C; courses 235A-235B-235C recommended. Comprehensive treatment of nonparametric statistical inference, including the most basic materials from classical nonparametrics, robustness, nonparametric estimation of a distribution function from incomplete data, curve estimation, and theory of resampling methodology. Offered in alternate years. (II-III.)

241. Asymptotic Theory of Statistics (4)
Lecture—3 hours; term paper. Prerequisite: course 231C; courses 235A-235B-235C desirable. Topics in asymptotic theory of statistics chosen from weak convergence, contiguity, empirical processes, Edgeworth expansion, and semiparametric inference. Offered in alternate years. (III.)

242. Introduction to Statistical Programming (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 130A and 130B or equivalent. Essentials of statistical computing using a general-purpose statistical language. Topics include algorithms; design; debugging and efficiency; object-oriented concepts; model specification and fitting; statistical visualization; data and text processing; databases; computer systems and platforms; comparison of scientific programming languages. Offered in alternate years.—II.

243. Computational Statistics (4)
Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 130A and 130B or equivalent, and Mathematics 167 or Mathematics 67 or equivalent. Numerical analysis; random number generation; computer experiments and resampling techniques (bootstrap, cross validation); numerical optimization; matrix decompositions and linear algebra computations; algorithms (markov chain monte carlo, expectation-maximization); algorithm design and efficiency; parallel and distributed computing. Offered in alternate years.—II.

250. Topics in Applied and Computational Statistics (4)
Lecture—3 hours; lecture/discussion—1 hour. Prerequisite: course 131A; course 232A recommended, not required. Resampling, nonparametric and semiparametric methods, incomplete data analysis, diagnostics, multivariate and time series analysis, applied Bayesian methods, sequential analysis and quality control, categorical data analysis, spatial and image analysis, computational biology, functional data analysis, models for correlated data, learning theory. May be repeated for credit with consent of graduate advisor. Not offered every year.—I, II, III.

251. Topics in Statistical Methods and Models (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 231B or the equivalent. Topics may include Bayesian analysis, nonparametric and semiparametric regression, sequential analysis, bootstrap, statistical methods in high dimensions, reliability, spatial processes, inference for stochastic process, stochastic methods in finance, empirical processes, change-point problems, asymptotics for parametric, nonparametric and semiparametric models, nonlinear time series, robustness. May be repeated for credit with consent of instructor. Not offered every year.—II. (II.)

252. Advanced Topics in Biostatistics (4)
Lecture—3 hours; discussion/laboratory—1 hour. Prerequisite: course 222, 223. Biostatistical methods and models selected from the following: genetics, bioinformatics and genomics; longitudinal or functional data; clinical trials and experimental design; analysis of environmental data; dose-response, nutrition and toxicology; survival analysis; observational studies and epidemiology; computer-intensive or Bayesian methods in biostatistics. May be repeated for credit with consent of adviser when topic differs. (Same course as Biostatistics 252.) Offered in alternate years.—III.

280. Orientation to Statistical Research (2)
Seminar—2 hours. Prerequisite: consent of instructor. Guided orientation to original statistical research papers, and oral presentations in class of such papers by students under the supervision of a faculty member. May be repeated one time for credit. (S/U grading only.)—III. (III.)

290. Seminar in Statistics (1-6)
Prerequisite: consent of instructor. Seminar on advanced topics in probability and statistics. (S/U grading only.)—I, II, III. (I, II, III.)

292. Graduate Group in Statistics Seminar (1-2)
Seminar—1-2 hours. Prerequisite: graduate standing. Advanced study in various fields of statistics with emphasis in applied topics, presented by members of the Graduate Group in Statistics and other guest speakers. (S/U grading only.)—III. (III.)

298. Directed Group Study (1-5)
Prerequisite: graduate standing, consent of instructor.

299. Individual Study (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

299D. Dissertation Research (1-12)
Prerequisite: advancement to candidacy for Ph.D., consent of instructor. (S/U grading only.)

Professional Courses

390. Methods of Teaching Statistics (2)
Lecture/discussion—1 hour; laboratory—1 hour. Prerequisite: graduate standing. Practical experience in methods/problems of teaching statistics at university undergraduate level. Lecturing techniques, analysis of tests and supporting material, preparation and grading of examinations, and use of statistical software. Emphasis on practical training. May be repeated for credit. (S/U grading only.)—I. (I.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: consent of instructor; graduate standing. (S/U grading only.)—I, II, III. (I, II, III.)

Professional Course

401. Methods in Statistical Consulting (3)
Lecture—3 hours; discussion—1 hour. Introduction to consulting, in-class consulting as a group, statistical consulting with clients, and in-class discussion of consulting problems. Clients are drawn from a pool of University clients. Students must be enrolled in the graduate program in Statistics or Biostatistics. May be repeated for credit with consent of graduate advisor. Not offered every year. (S/U grading only.)—I, II, III. (I, II, III.)

Statistics (A Graduate Program)

Wolfgang Polonik, Ph.D., Chairperson of the Program

Program Office. 4118 Mathematical Sciences Building (530) 692-5194; *http://www-stat.ucdavis.edu*

Faculty

Alexander Aue, Ph.D., Assistant Professor *(Statistics)*
Ethan Anderes, Ph.D., Assistant Professor *(Statistics)*
Laurel Beckett, Ph.D., Professor *(Public Health Sciences)*
Prabir Burman, Ph.D., Professor *(Statistics)*
Colin Cameron, Ph.D., Professor *(Economics)*
Christiana Drake, Ph.D., Professor *(Statistics)*
Thomas B. Farver, Ph.D., Professor *(Population Health and Reproduction)*
Peter Hall, Ph.D., Professor *(Statistics)*
Fushing Hsieh, Ph.D., Professor *(Statistics)*
Jiming Jiang, Ph.D., Professor *(Statistics)*
Oscar Jorda, Ph.D., Associate Professor *(Economics)*
Thomas Lee, Ph.D., Professor *(Statistics)*
Hans-Georg Müller, M.D., Ph.D., Professor *(Statistics)*
Debashis Paul, Ph.D. Assistant Professor *(Statistics)*
Jie Peng, Ph.D., Associate Professor *(Statistics)*
Wolfgang Polonik, Ph.D., Professor *(Statistics)*
David Rocke, Ph.D., Professor *(Public Health Sciences)*
George G. Roussas, Ph.D., Professor *(Statistics)*
Naoki Saito, Ph.D., Professor *(Mathematics)*
Francisco J. Samaniego, Ph.D., Professor *(Statistics)*
Rituparna Sen, Ph.D., Assistant Professor *(Statistics)*
Duncan Temple Lang, Ph.D., Associate Professor *(Statistics)*
Chih-Ling Tsai, Ph.D., Professor *(Graduate School of Management)*
Jane-Ling Wang, Ph.D., Professor *(Statistics)*

Emeriti Faculty

Rudolph Beran, Ph.D., Professor Emeritus
P.K. Bhattacharya, Ph.D., Professor Emeritus
Alan P. Fenech, Ph.D., Professor Emeritus
Yue-Pok (Ed) Mack, Ph.D., Professor Emeritus
Robert H. Shumway, Ph.D., Professor Emeritus
Alvin D. Wiggins, Ph.D., Professor Emeritus

Affiliated Faculty

Rahman Azari, Ph.D., Lecturer *(Statistics)*

Graduate Study. The Graduate Program in Statistics offers programs of study and research leading to the M.S. and Ph.D. degrees. The M.S. gives students a strong foundation in the theory of statistics as well as substantial familiarity with the most widely used statistical methods. Facility in computer programming is essential for some of the course work. The supervised statistical consulting required of all M.S. students has proven to be a valuable educational experience. The Ph.D. program combines advanced course work in statistics and probability with the opportunity for in-depth concurrent study in an applied field. For detailed information contact the Chairperson of the Program or the Graduate Adviser.

Preparation. Preparation for the graduate program requires a year of calculus, a course in linear algebra, facility with a programming language and upper division coursework in mathematics and/or statistics. For admission to the Ph.D. program, course work requirements for the master's degree, and at least one semester/two quarters of advanced calculus must be completed.

Graduate Adviser. P. Burman

Subject A

See University Requirements, on page 93.

Surgery

See Surgery (SUR), on page 409; and Surgical and Radiological Sciences (VSR), on page 527.

Surgical and Radiological Sciences

See Veterinary Medicine, School of, on page 517.

Technocultural Studies

(College of Letters and Science)

Jesse Drew, Ph.D., Program Director

Program Office. 101 Art Building (530) 752-0105; *http://technoculture.ucdavis.edu*

Committee in Charge

Elizabeth Constable, Ph.D. *(Film Studies)*
Jesse Drew, Ph.D. *(Technocultural Studies)*
Frances Dyson, Ph.D. *(Technocultural Studies)*
Andy Jones, Ph.D. *(English)*
Douglas Kahn, Ph.D. *(Technocultural Studies)*
Michael Neff, Ph.D. *(Technocultural Studies)*
Bob Ostertag, Ph.D. *(Technocultural Studies)*
Laurie San Martin, M.F.A. *(Music)*
Kathryn Sylva, M.F.A. *(Design)*
Julie Wyman, M.F.A. *(Technocultural Studies)*

Faculty

Jesse Drew, Ph.D., Associate Professor
Frances Dyson, Ph.D., Associate Professor
Douglas Kahn, Ph.D., Professor
Michael Neff, Ph.D., Assistant Professor *(Computer Science, Technocultural Studies)*
Bob Ostertag, Ph.D., Professor
Julie Wyman, M.F.A., Assistant Professor

Emeriti Faculty

Lynn Hershman, M.A., Professor Emerita

The Major Program

The major is an interdisciplinary integration of current research in cultural history and theory with innovative hands-on production in digital media and "low-tech." It focuses on the fine and performing arts, media arts, community media, literature and cultural studies as they relate to technology and science. Backed by critical perspectives and the latest forms of research and production skills, students enjoy the mobility to explore individual research and expression, project-based collaboration and community engagement.

The Program

Preparatory course work involves a solid introduction to the history, ideas and current activities of technocultural studies, along with technical skill courses enabling individuals to get up to speed on digital imaging, sound, digital video and Web production, among other skills. For depth subject matter, students in the major select to concentrate on either critical studies or creative production emphases, and work toward a final project. All majors are required to take at least one course from another department or program relevant to their area of study, upon approval from TCS, and may take more courses with approval. The final project for the critical studies emphasis consists of a substantial research paper. The final project for the creative production emphasis will be a major individual or collaborative work. Plans for final projects must be approved in advance.

Career Paths. Technocultural Studies is designed to prepare graduates to be highly adaptable, collaborative, multi-skilled and current with the latest developments. Perhaps most importantly is self-motivation: students do best when fueled by their own passions and plot their own directions, while held to very high standards. We feel this is the best education for living and working in a complex, rapidly changing world. Final research papers and creative production portfolios will provide graduate school admissions committees, employers or clients with tangible evidence of TCS graduates' track records and talents.

A.B. Major Requirements:

	UNITS
Preparatory Subject Matter	**28**
Technocultural Studies 1, 2, 4, 5, 6, 7A-E	24
American Studies 1A or 5	4
Depth Subject Matter	**44**
Technocultural Studies 190, 191	8
Production emphasis	32
Choose five from production based Technocultural Studies 100, 101, 103, 104, 110, 111, 112, 113, 121, 122, 123, 192, plus two from Technocultural Studies 120, 150, 151, 152, 153, 154, 155, 158, 159, plus a four-unit class from another department or program relevant to the student's area of concentration, as approved by Technocultural Studies.	
Studies emphasis	32
Choose two from production based Technocultural Studies 100, 101, 103, 104, 110, 111, 112, 113, 121, 122, 123, 192, plus five from Technocultural Studies 120, 150, 151, 152, 153, 154, 155, 158, 159, plus a four-unit class from another department or program relevant to student's area of concentration, as approved by Technocultural Studies.	
Technocultural Studies 198	4
Total Units for the Major	**72**

Major Adviser. See Program office.

Courses in Technocultural Studies (TCS)

Lower Division Courses

1. Introduction to Technocultural Studies (4)
Lecture—3 hours; extensive writing. Contemporary developments in the fine and performing arts, media arts, digital arts, and literature as they relate to technological and scientific practices. GE credit: ArtHum.—Ostertag

2. Critiques of Media (4)
Lecture/discussion—3 hours; term paper. Introduction to different forms of critical analysis of media, with focus on creative responses to the media within visual arts, media arts, and net culture. Response of artists to the power of mass media, from early forms of photomontage through contemporary "culture-jamming" and alternative media networks. GE credit: ArtHum.—Wyman

4. Parallels in Art and Science (4)
Lecture—3 hours; term paper. Issues arising from historical and contemporary encounters between the arts and sciences, with emphasis on comparative notions of research, experimentation, and progress. GE credit: ArtHum.

5. Media Archaeology (4)
Lecture/discussion—3 hours; term paper. Evolution of media technologies and practices beginning in the 19th Century as they relate to contemporary digital arts practices. Special focus on the reconstruction of the social and artistic possibilities of lost and obsolete media technologies. GE credit: ArtHum. Drew

6. Technoculture and the Popular Imagination (4)
Lecture—3 hours; extensive writing. Issues of technological and scientific developments as conveyed through mass media and popular culture with special attention to public spectacle, exhibitions, broadcasts, performances, demonstrations and literary fictions and journalistic accounts. GE credit: ArtHum.—Kahn

7A-E. Technocultural Workshop (1)
Seminar—1 hour. Workshops in technocultural digital skills: (A) Digital Imaging; (B) Digital Video; (C) Digital Sound; (D) Web Design; (E) Topics in Digital Production.—I. (I.)

Upper Division Courses

100. Experimental Digital Cinema I (4)
Lecture/discussion—3 hours; laboratory—3 hours. Experimental approaches to the making of film and video in the age of digital technologies. Opportunities for independent producers arising from new media. Instruction in technical, conceptual and creative skills for taking a project from idea to fruition.—Wyman

101. Experimental Digital Cinema II (4)
Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 100. Continuation of course 100 with further exploration of digital cinema creation. Additional topics include new modes of distribution, streaming, installation and exhibition.—Wyman

103. Interactivity and Animation (4)
Lecture/discussion—3 hours; laboratory—3 hours. Fundamentals of creating interactive screen-based work. Theories of interactivity, linear versus non-linear structures, and audience involvement and participation. Use of digital production tools to produce class projects.—Drew

104. Documentary Production (4)
Lecture/discussion—3 hours; project. Prerequisite: course 7B or the equivalent, course 155. Traditional and new forms of documentary, with focus on technocultural issues. Skills and strategies for producing work in various media. Progression through all stages of production, from conception through post-production to critique.—Drew, Wyman

110. Object-Oriented Programming for Artists (4)
Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 1. Introduction to object-oriented programming for artists. Focus on understanding the metaphors and potential of object-oriented programming for sound, video, performance, and interactive installations.—III. Ostertag

111. Community Media Production (4)
Lecture/discussion—3 hours; laboratory—3 hours. Use of video and new media tools to address social issues among neighborhood and community groups. Students will use basic video, sound, and lighting techniques as they work with local groups in a group video project.—III. (III.)

112. New Radio Features and Documentary (4)
Lecture/discussion—3 hours; laboratory—3 hours. New feature and documentary production for radio and other audiophonic media, including audio streaming Web sites and installation. Emphasis on new and experimental approaches to audio production for broadcast on community radio and in international arts programming.

113. Community Networks (4)
Lecture/discussion—3 hours; laboratory—3 hours. Impact and implications of computer-based networks in community, civic, and social life. Subjects may include community-access computer sites, neighborhood wireless networks, the digital divide, open-source software, and citizen action.

120. History of Sound in the Arts (4)
Lecture—3 hours; term paper. Prerequisite: course 1. A survey of the use of sound, voice, noise, and modes of listening in the modernist, avant-garde, and experimental arts, from the late 19th Century to the present. Focus on audiophonic and audiovisual technologies.—Kahn

121. Introduction to Sonic Arts (4)
Lecture/discussion—3 hours; lecture/laboratory—3 hours. Prerequisite: course 7C. Introduction to the use of sound within the arts. Techniques and aesthetics of experimental contemporary practices. Creation of original sound works.—Ostertag

122. Intermediate Sonic Arts (4)
Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: course 121, 170C. Techniques of recording, editing, mixing, and synthesis to combine voice, field recordings, and electronic signals. Incorporating live, recorded, and found sounds to create multidimensional stories. Presentation of live performances, audio recordings, and sound installations.—Ostertag

123. Sight and Soundtrack (4)
Lecture/discussion—3 hours; laboratory—3 hours. Prerequisite: courses 7C, 170C. The use of sound to articulate, lend mood or subconsciously underscore visual, environmental or performative situations, combining music, voice, sound effects and other noises to create sound designs that enhance, alter or support action and movement.—Ostertag

125. Advanced Sound: Performance and Improvisation (4)
Workshop—3 hours; practice—3 hours. Prerequisite: courses 121 and 122 or consent of instructor. Culmination of TCS sound courses. Class will focus on performance and improvisation, culminating in a final public performance. Students will be expected to do extensive reading and rehearsal outside of class time.—III. (III.) Ostertag

130. Fundamentals of 3D Computer Graphics (4)
Lecture—3 hours; laboratory—3 hours. A foundation course that teaches students the theory of three dimensional computer graphics, including modeling, rendering and animation. Development of practical skills through the use of professional software to create computer graphics.—I. (I.) Neff

131. Character Animation (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 130 or consent of instructor. The art of character animation in three dimensional computer animation. Movement theory, principles of animation, animation timing. Development of technical and practical skills.—III. (III.) Neff

150. Introduction to Theories of the Technoculture (4)
Lecture/discussion—3 hours; extensive writing. Major cultural theories of technology with emphasis on media, communications, and the arts. Changing relationships between technologies, humans, and culture. Focus on the evolution of modern technologies and their reception within popular and applied contexts. GE credit: ArtHum—Dyson

151. Topics in Virtuality (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1. Social, political, economic, and aesthetic factors in virtual reality. Artificial environments, telepresence, and simulated experience. Focus on contemporary artists' work and writing.—Dyson

152. New Trends in Technocultural Arts (4)
Lecture/discussion—3 hours; term paper. Current work at the intersection of the arts, culture, science, and technology including biological and medical sciences, computer science and communications, and artificial intelligence and digital media.—Dyson

153. Concepts of Innovative Soundtracks (4)
Lecture/discussion—3 hours; term paper. Innovative and unconventional soundtracks in cinema, media arts, and fine arts. Introduction to basic analytical skills for understanding sound-image relationships.—Kahn

154. Outsider Machines (4)
Lecture/discussion—3 hours; term paper. Invention, adaptation and use of technologies outside the mainstream, commonsense, and the possible. Topics include machines as metaphor and embodied thought, eccentric customizing and fictional technologies.

155. Introduction to Documentary Studies (4)
Lecture/discussion—3 hours; term paper. Recent evolution of the documentary. The personal essay film; found-footage/appropriation work; non-linear, multi-media forms; spoken word; storytelling; oral history recordings; and other examples of documentary expression.—I. (I.) Drew

158. Technology and the Modern American Body (4)
Lecture/discussion—3 hours; term paper. Prerequisite: course 1 and either American Studies 1 or 5. The history and analysis of the relationships between human bodies and technologies in modern society. Dominant and eccentric examples of how human bodies and technologies influence one another and reveal underlying cultural assumptions. (Same course as American Studies 158.) GE credit: ArtHum.—de la Pena

159. Media Subcultures (4)
Lecture/discussion—3 hours; term paper. Relationships between subcultural groups and media technologies. Media as the cohesive and persuasive force of subcultural activities. List-servs, Web sites, free radio, fan 'zines, and hip-hop culture. GE credit: Div.—II. (II.) Drew

170A-E. Advanced Technocultural Workshop (1)
Seminar—1 hour. Prerequisite: course 7A or the equivalent. Workshops in advanced technocultural digital skills: (A) Digital Imaging; (B) Digital Video; (C) Digital Sound; (D) Web Design; (E) Topics in Digital Production.

190. Research Methods in Technocultural Studies (4)
Lecture/discussion—3 hours; project. Introduction to basic research methods for Technocultural Studies: electronic and archived images, sounds and data, satellite downlinking, radiowave scanning, and oral histories.—Drew

191. Writing Across Media (4)
Lecture/discussion—3 hours; extensive writing. Introduction to experimental approaches to writing for different media and artistic practices. How written texts relate to the images, sounds, and performances in digital and media production.—Jones

192. Internship (1-4)
Internship—3-12 hours. Supervised internship on or off campus in area relevant to Technocultural Studies. May be repeated two times for credit. (P/NP grading only.)

197T. Tutoring in Technocultural Studies (1-5)
Tutorial—3-15 hours. Prerequisite: consent of instructor. Undergraduates assist the instructor by tutoring students in one of the department's regularly scheduled courses. May be repeated for credit up to eight units. (P/NP grading only.)—I, II, III. (I, II, III.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor.
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. Guided study with faculty member in independent scholarly activity. May be repeated for credit up to eight units.
(P/NP grading only.)

Textile Arts and Costume Design

See Design, on page 210.

Textile Science

See Fiber and Polymer Science, on page 302.

Textiles (A Graduate Group)

Gang Sun, Ph.D., Chairperson of the Group

Group Office. 129 Everson Hall
(530) 752-6650;
http://textiles.ucdavis.edu

Faculty

Colin A. Carter, Ph.D., Professor *(Agricultural and Resource Economics)*
Hidergarde Heymann. Professor *(Viticulture and Enology)*
You-Lo Hsieh, Ph.D., Professor *(Textiles and Clothing)*
Joel T. Johnson, Professor *(Psychology)*
Susan B. Kaiser, Ph.D., Professor *(Textiles and Clothing, Women and Gender Studies)*
Zuhair A. Munir, Ph.D., Professor *(Chemical Engineering and Materials Science)*
Ning Pan, Ph.D., Professor *(Textiles and Clothing, Biological and Agricultural Engineering)*
Margaret H. Rucker, Ph.D., Professor *(Textiles and Clothing)*
James F. Shackelford, Ph.D., Professor *(Chemical Engineering and Materials Science)*
Charles F. Shoemaker, Ph.D., Professor *(Food Science and Technology)*
Gang Sun, Ph.D., Professor *(Textiles and Clothing)*

Emeriti Faculty

Gyongy Laky, M.A., Professor Emeritus *(Textiles and Clothing)*
Dean MacCannell, Ph.D., Professor Emeritus *(Landscape Architecture)*
Howard G. Schutz, Ph.D., Professor Emeritus *(Consumer Science)*
Jo Ann C. Stabb, M.A., Senior Lecturer Emeritus *(Design)*
S. Haig Zeronian, Ph.D., Professor Emeritus *(Textiles and Clothing)*

Graduate Study. The Graduate Group in Textiles offers a program of study and research leading to the M.S. degree. Students in the program use an interdisciplinary approach emphasizing the physical and behavioral science aspects of textiles. Research areas include chemical, physical, biochemical, and mechanical properties of fibers and polymers as well as fibrous assemblies, including composites, paper, and nonwovens; and psychological and sociological factors relating to perception and consumption of textiles and apparel. Extensive specialized fiber, polymer, and textiles research facilities and a behavioral research laboratory are available. For detailed information regarding the program, address the Chairperson of the Group.

Graduate Advisers. Y.L. Hsieh, G. Sun

Textiles and Clothing

(College of Agricultural and Environmental Sciences)

You-Lo Hsieh, Ph.D., Chairperson of the Division

Division Office. 129 Everson Hall
(530) 752-6650; http://textiles.ucdavis.edu

Faculty

You-Lo Hsieh, Ph.D., Professor
Susan B. Kaiser, Ph.D., Professor
Ning Pan, Ph.D., Professor
Margaret H. Rucker, Ph.D., Professor
Gang Sun, Ph.D., Professor

Emeriti Faculty

Stephen C. Jett, Ph.D., Professor Emeritus
Mary Ann Morris, Ph.D., Professor Emeritus
S. Haig Zeronian, Ph.D., D.Sc., Professor Emeritus

Affiliated Faculty

Joan Chandler, M.S., Lecturer

The Major Program

The textiles and clothing major emphasizes the connections among *(a)* the physical characteristics of textile products, *(b)* human perceptions of and behavior toward these products, and *(c)* global economic trends affecting the textile/apparel marketplace. An integrative knowledge base links textile products with people and processes, to focus on the production, distribution, and consumer use of textiles and apparel; see also Fiber and Polymer Science, on page 302.

The Program. The textiles and clothing major offers two options: textile science and marketing/economics. The Textile Science option provides students with a broad knowledge base in both the social and physical sciences. This base includes production, end-use applications and care of textiles and apparel, physical and chemical properties of textiles, and social-psychological and economic aspects of textiles and clothing. The Marketing/Economics option emphasizes social science and business course work, while also providing students with an awareness of the physical nature of textile products.

Internships and Career Alternatives. Textiles and clothing majors can pursue internships and careers in apparel production and merchandising, retail management, international marketing, textile testing and conservation, and textiles journalism. The majority of textiles and clothing graduates accept entry-level management and technical positions within the textile and apparel industry or in related fields, (e.g., merchandising and marketing, production, research and development, technical service and design). Students may also pursue graduate studies in textiles, business, and other areas depending on their specific selections of restricted elective course work.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 42-44
Plant Sciences 21 or Computer Science Engineering 15 or 30 3-4
Economics 1A-1B 8
Anthropology 2, Science and Society 1, Art History 1A, 1B, 1C, or 1D 4
Physics 1A or 10 3-4
Psychology 1 4
Sociology 2 4
Statistics 13 4
Textiles and Clothing 6, 7, 8 12

Select one of the following two options:

Marketing/Economics option

Additional Preparatory Subject Matter for the option 18-19
Management 11A-11B 8
Chemistry 10 or 2A 4-5
Mathematics 16A-16B 6

Depth Subject Matter 56-57
Agricultural and Resource Economics 100A-100B, 106, 136 16
Statistics 103 4
Psychology 151 or Consumer Science 100 3-4
Fiber and Polymer Science 110, Textiles and Clothing 107, 162, 162L, 163, 163L, 164, 165, 171, 173, 174 33

Restricted Electives 12
Courses selected from the following: Agricultural and Resource Economics 18, 112, 142, 155, 157, 171A, 171B, Anthropology 122A, 126A, Consumer Science 100, Design 77, 107, 143, Economics 101, 121A, 121B, 134, 162, and other relevant course work, Foreign language units may be used to satisfy any or all of the required 12 units, Mathematics 16C, Psychology 151, Sociology 123, 126, 140, 141, 145, Textiles and Clothing 180A, 180B, 230, 293, with consent of instructor, and a maximum of 5 units in either Textiles and Clothing 192 or 199.

Textile Science option

Additional Preparatory Subject Matter for the option 19
Chemistry 2A, 2B, 8A, 8B 16
Mathematics 16A 3

Depth Subject Matter 51-52
Agricultural and Resource Economics 112, 113 8
Design 143 4
Psychology 151 or Consumer Science 100 3-4
Fiber and Polymer Science 100, 161, 161L, Textiles and Clothing 107, 162, 162L, 163, 163L, 164, 165, 171, 173, 174 36

Restricted Electives 16
Courses selected from the following: Agricultural and Resource Economics 18, 141, 142, 155, 171A, 171B, Plant Sciences 120, Chemistry 2C, 128A, 128B, 128C, Communication 42, 130, 136, 140, Community and Regional Development 162, Consumer Science 100, Design 77, 107, 142A, 142B, 160A, 160B, 160C, 170A, 170B, 170C, Economics100, 101, 121A, 121B, 134, Fiber and Polymer Science 110, Foreign Language units may be used to satisfy any or all of the required 16 units, Management 11A, 11B, Mathematics 16B, 16C, Psychology 151, Sociology 25, 123, 126, 140, 148, 159, 175, Statistics 106, 108; Textiles and Clothing 180A, 180B, 230, 293, with consent of instructor, and a maximum of 5 units in either Textiles and Clothing 192 or 199.

Total Units for the Major 128-132

Major Adviser. S. Kaiser

Advising Center for the major is located in 129B Everson Hall (530) 752-4417.

Minor Program Requirements:

The Division of Textiles and Clothing offers a minor program for non-majors interested in satisfying secondary career objectives. For acceptance into the program see the staff adviser in 129B Everson Hall.

UNITS

Textiles and Clothing 18
Textiles and Clothing 6, 7, or 8 4
Courses selected from Fiber and Polymer Science 100, 110, 161, 161L, Textiles and Clothing 107, 162-162L, 163-163L, 164, 165, 171, 173, 174 14

Minor Adviser. G. Sun

Courses in Textiles and Clothing (TXC)

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing. See also courses in Fiber and Polymer Science, on page 302.

Lower Division Courses

6. Introduction to Textiles (4)
Lecture—3 hours; laboratory—3 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized. GE credit: SciEng.—I. (I.) Sun

7. Style and Cultural Studies (4)
Lecture/discussion—3 hours; discussion/laboratory—1 hour. The multiple and overlapping influences of gender, sexuality, ethnicity, and class on constructions of identity and community are explored through the study of style in popular culture and everyday life. Continuity and change in clothing and appearance styles are interpreted. GE credit: SocSci, Div, Wrt.—III. (III.) Kaiser

8. The Textile and Apparel Industries (4)
Lecture—4 hours. Textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods. GE credit: SocSci, Div.—I. (I.) Rucker

92. Internship in Textiles and Clothing (1-12)
Internship—3-36 hours. Prerequisite: consent of instructor. Work experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

99. Special Study for Lower Division Students (1-5)
(P/NP grading only.)

Upper Division Courses

107. Social and Psychological Aspects of Clothing (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Sociology 2. Social and cognitive factors influencing management and perception of personal appearance in everyday life. Concepts and methods appropriate to the study of meaning of clothes in social and cultural contexts. GE credit: SocSci, Div, Wrt.—I. (I.) Kaiser, Chandler

162. Textile Fabrics (3)
Lecture—3 hours. Prerequisite: course 6. Properties of fabrics as related to serviceability, comfort, and appearance. GE credit: SciEng.—III. (III.) Pan

162L. Textile Fabrics Laboratory (1)
Laboratory—3 hours. Prerequisite: course 162 (may be taken concurrently). Laboratory methods and procedures employed in studying properties of textile fabrics as related to serviceability, comfort, and appearance.—III. (III.) Pan

163. Textile Coloration and Finishing (3)
Lecture—3 hours. Prerequisite: course 6, Fiber and Polymer Science 110, or Chemistry 8B. Basic principles of textile dyeing, printing, and finishing; color theory; structure, properties, and application of dyes and finishes; factors affecting application and fastness; maintenance of dyed and finished textiles.—III. (III.) Sun

163L. Textile Coloration and Finishing Laboratory (1)
Laboratory—3 hours. Prerequisite: course 163 (may be taken concurrently). Demonstrates various aspects of dyeing, printing, and finishing of textile substrates including the effect of fiber and finish type, and physical and chemical variables on dyeing and finishing processes and on the properties of the resultant textile.—III. (III.) Sun

164. Principles of Apparel Production (3)
Lecture—3 hours. Prerequisite: course 6 or 8. Overview of characteristics, technology, processes, and research in apparel manufacturing industries including study of government statistics, material utilization and fabrication, mechanization, management, and production engineering.—II. (II.) Chandler

165. Textile Processes (3)
Lecture/discussion—3 hours. Prerequisite: course 6. Physical processes involved in the production of textiles from the individual fiber to the finished fabric. Includes spinning, texturing, yarn formation, weaving preparation, weaving and knitting, tufting and fabric finishing.

171. Clothing Materials Science (4)
Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 6, 8, and senior standing. The properties, characterization, and performance evaluation of clothing materials and structures for specific functional applications. Principles and methods related to wetting and transport properties, fabric hand and aesthetic properties, clothing comfort, and material and assembly technology.—II. (II.) Hsieh

173. Principles of Fashion Marketing (3)
Lecture—3 hours. Prerequisite: course 8, Economics 1A, Agricultural and Resource Economics 113 or 136. Study of basic elements of fashion marketing including philosophy and objectives, organization, merchandising, pricing, promotion and personnel. Offered in alternate years.—III. Rucker

174. Introduction to World Trade in Textiles and Clothing (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: course 8. Structure of the global fiber/textile/apparel complex and its distribution patterns with an overview of political, economic and technological factors that are changing these industries and their markets. GE credit: SocSci, Div.—II. (II.) Rucker

180A-180B. Introduction to Research in Textiles (2-2)
Laboratory—6 hours. Prerequisite: senior standing with textile-related major, and consent of instructor. Senior thesis on independent problems. Research begun in course 180A will be continued and completed in course 180B. (Deferred grading only, pending completion of sequence.)—I, II, III. (I, II, III.)

192. Internship in Textiles and Clothing (1-12)
laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learn experience off campus in a textiles or clothing-related area. Supervision by a member of the Textiles and Clothing faculty. (P/NP grading only.)

197T. Tutoring in Textiles and Clothing (1-5)
Discussion/laboratory—3-15 hours. Prerequisite: upper division textiles-related major and consent of instructor. Tutoring of students in Textiles and Clothing courses. Assistance with discussion groups and laboratory sections under supervision of instructor. May be repeated for credit if tutoring another textiles course. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

230. Behavioral Science Concepts in Textiles (3)
Lecture—3 hours. Prerequisite: course 107, upper division or graduate course in statistics (e.g., Agricultural Management and Rangeland Resources 120) and one in a behavioral science (e.g., Psychology 145). Examination of theories and research concerning relationships between clothing and human behavior with emphasis on research techniques, including methods of measuring clothing variables. Offered in alternate years.—I. Kaiser

290. Seminar (1)
Seminar—1 hour. Critical review of selected topics of current interest in textiles. (S/U grading only.)—I, II. (I, II.)

290C. Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing; consent of instructor. Individual faculty members meet with their graduate students. Critical presentations of original research are made by graduate students. Research activities are planned. Discussions are led by major professors for their research groups. (S/U grading only.)—I, II, III. (I, II, III.)

293. Recent Advances in Textiles (3)
Lecture—3 hours. Prerequisite: two upper division courses in Textiles and Clothing or consent of instructor. Critical reading and evaluation on selected topics of current interest in textiles. Multidisciplinary aspects of the topics selected will be stressed. May be repeated for credit.—(III.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Theatre and Dance

(College of Letters and Science)

David Grenke, Chairperson of the Department

Department Office. 101 Art Building
(530) 752-0888; Fax (530) 752-8818
http://theatredance.ucdavis.edu

Faculty

Sarah Pia Anderson, Professor
Larry Bogad, Ph.D., Associate Professor
Della Davidson, M.A., Professor
David Grenke, Professor
Lynette Hunter, Ph.D., Professor
John Iacovelli, M.F.A., Professor
Peter Lichtenfels, Professor
Jade McCutcheon, Doctorate of Creative Arts, Assistant Professor
Bella Merlin, Ph.D., Professor
Maggie Morgan, M.F.A., Associate Professor
Thomas J. Munn, Professor
Jon Rossini, Ph.D., Associate Professor
Peggy Shannon, Professor

Emeriti Faculty

Bobbie J. Bolden, M.A., Senior Lecturer Emerita
Ruby Cohn, Ph.D., Professor Emerita
Harry C. Johnson, M.A., Professor Emeritus
William E. Kleb, D.F.A., Professor Emeritus
Barbara Sellers-Young, Ph.D., Professor Emerita
Alan A. Stambusky, Ph.D., Professor Emeritus

The Dramatic Art Major Program

The A.B. degree in Dramatic Art provides students with an appreciation for and understanding of performance and its role in culture and society. The program offers a strong foundation in all aspects of drama, theatre, dance performance, and production. Students build significant skills in specific areas as well as achieving a broad knowledge of theatre, dance and film.

Productions and Facilities. Each year's schedule includes undergraduate festivals in theatre, dance, and film; opportunities to work with professional directors and choreographers in three main stage productions; and performance projects and established scripts developed by M.F.A students. These productions take place on our proscenium (Main), thrust (Wyatt), black box (Arena), performance studio (University Club) stages as well as in the Mondavi Center's Studio Theatre and Jackson Hall. These productions are part of the academic

program of the department and serve an important purpose in the study of theatre and dance. Participation is open to all students.

A.B. Major Requirements:

Theatre Emphasis

UNITS

Preparatory Subject Matter 33

Dramatic Art 20, 24, 25, 26 14
Dramatic Art 21A or 14 4
Choose 4 units from Dramatic Art 21B, 40A, 40B, 41A, 41B, 98, 99, African American and African Studies 51 or courses in other departments with departmental approval 4
Dramatic Art 30 11
Participation in at least two of the following areas: acting/dance; directing/choreography/playwriting/stage management/dramaturgy; design/studio/technical production; and crew assignments for a minimum of two productions which may include stage management, fly crew, stage running crew, props, running crew, lighting board operator, follow spot operator, sound board operator, costume running crew, dresser, make-up

Depth Subject Matter 45-47

Dramatic Art 156A, 156B, 156C 12
One course from Dramatic Art 124A, 124B, 124C, 124D 4
One course from Dramatic Art 150, 154, 155, 155A, 159 4
One course from Dramatic Art 121A, 121B, 122A, 122B, 141, 143 3-4
One course from Dramatic Art 126, 127A, 127B, 140A, 160A 3-4
A minimum of 10 units chosen from the following: Dramatic Art 121A, 121B, 122A, 122B, 124A, 124B, 124C, 124D, 125, 126, 127A, 127B, 130, 140A, 141, 143, 150, 154, 155A, 159, 160A, 160B, 170 10
Dramatic Art 180 9
Participation in University Theatre in at least two of the following areas: acting/dance; directing/choreography/playwriting/stage management/dramaturgy; design/studio/technical production; and crew assignments for a minimum of two productions which may include stage management, fly crew, stage running crew, props, running crew, lighting board operator, follow spot operator, sound board operator, costume running crew, dresser, make-up

Total Units for the Major 78

Dance Emphasis

UNITS

Preparatory Subject Matter 28

Dramatic Art 14, 24, 26 11
Choose 10 units from Dramatic Art 21A, 40A, 40B, 41A, 41B, 42A, 42B, 44A, 44B, African American and African Studies 51 10
Dramatic Art 30; crew 4
Dramatic Art 30; performance 3

Depth Subject Matter 45

Dramatic Art 140A, 140B, 140C, 141, 145 19
Choose 19 units from African American and African Studies 155, Dramatic Art 142, 143, 154, 155, 156C, 159, Music 107A, Native American Studies 125 19
Dramatic Art 124C, 126 7

Total Units for the Major 73

Major Adviser. _____

Minor Program Requirements:

UNITS

Dramatic Art 22

One course from Dramatic Art 20, 21A, 24, 25, 26 3-4
Two courses chosen from Dramatic Art 156A, 156B, 156C 8
Two courses chosen from Dramatic Art 121A, 121B, 122A, 122B, 124A, 124B, 124C, 124D, 125, 126, 127A, 127B, 130, 140A, 141, 142, 143, 150, 154, 155, 155A, 159, 160A, 160B, 170 6
Dramatic Art 180 5
Participation in University Theatre in at least two of the following areas: acting/dance; directing/choreography/playwriting/stage management/dramaturgy; design/studio/technical production; and crew assignments for a minimum of one production which may include stage management, fly crew, stage running crew, props, running crew, lighting board operator, follow spot operator, sound board operator, costume running crew, dresser, make-up

Transfer Students. As described above, all students completing a major in Dramatic Art must participate in dramatic productions, including work in at least three of the following four areas: acting/dance, design, studio (scenic, costume, lighting, painting, props, sound), directing/playwriting/stage management. Such experience gained prior to transfer to UC Davis may count toward partial satisfaction of this requirement; transfer students should see the major adviser for an evaluation of your previous experience. While in residence at UC Davis, transfer students are required to participate in a minimum of five dramatic productions and that participation must include work in at least three of the four areas specified above, as well as running crew.

Guest Artists. The Granada Visiting Artists Program brings distinguished professional artists to the campus each year, to be in residence for a quarter. These working professional artists interact closely with students in the classroom and rehearsal halls and provide them excellent pre-professional experiences of theater practice.

Graduate Study. The Department of Dramatic Art offers programs of study and research leading to the M.F.A. in Dramatic Art (acting, directing, design, choreography) and contributing to the Graduate Group Ph.D in Performance Studies. Detailed information may be obtained by contacting the Graduate Adviser.

Graduate Advisers. *Ph.D. Performance Studies and Graduate Group:* L. Hunter; *M.F.A. Dramatic Art Program:* Maggie Morgan

Courses in Dramatic Art (DRA)

Lower Division Courses

1. Theatre, Performance and Culture (4)
Lecture—3 hours; discussion—1 hour. Introductory investigation of the nature of performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, performance art, dance, sports, rituals, political and religious events, and other "occasions." Not open to students who have completed course 1S. GE credit: ArtHum, Div, Wrt.—Bogad, Hunter, Rossini

1S. Theatre, Performance and Culture (4)
Lecture—3 hours; discussion—1 hour. Introductory investigation of the nature of performance, moving from performance theory to consideration of various manifestations of performance including theatre, film and media, performance art, dance, sports, rituals, political and religious events, and other "occasions." For Short Term Programs Abroad. Not open to students who have completed course 1. Not offered every year. GE credit: ArtHum, Div, Wrt.—McCutcheon

5. Understanding Performance: Appreciation of Modern Theatre, Dance, Film and Performance Art (4)
Lecture/discussion—2 hours; laboratory/discussion—5 hours; tutorial—1 hour. Relevance of theatre and performance to modern culture and society. Approaches to theatre/dance/media/performance art, integrated into Mondavi Centre for the Arts and Theatre and Dance Department programs. GE Credit: ArtHum, Div.—I, III. (I, III.)

10. Introduction to Acting (3)
Laboratory/discussion—4 hours; term paper. Fundamentals of movement, speech, theatre games, and improvisation. Selected reading and viewing of theatre productions. Intended for students not specializing in Dramatic Art.—I, II, III. (I, II, III.)

14. Introduction to Contemporary Dance (4)
Lecture—3 hours; laboratory—3 hours. Introduction to basic issues and methods in contemporary dance. Focus on preparing the student for dancing and dance-making through basic techniques of improvisation and composition. Consideration of dance as a cultural practice.—I, II, III. (I, II, III.)

20. Introduction to Dramatic Art (4)
Lecture—3 hours; discussion—1 hour. Understanding and appreciation of both the distinctive and collaborative contributions of playwright, actor, director, and designer to the total work of dramatic art. Study of plays from the major periods of dramatic art in their cultural contexts. GE credit: ArtHum.—I, III. (I, III.)

21A. Fundamentals of Acting (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 20. Physical and psychological resources of the actor. Experience in individual and group contact and communication, theatre games, advanced improvisation, sound and movement dynamics. Viewing of theatre productions. Limited to those planning to major in Dramatic Art.—I, II (I, II.)

21B. Fundamentals of Acting (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: course 21A and consent of instructor. Theory and practice of acting with emphasis on character analysis, interpretation, and development. Acting in a student-directed project. Viewing of theatre productions. Limited to those planning to major in Dramatic Art.—II, III (II, III.)

24. Visual Aspects of Dramatic Art (4)
Lecture—3 hours; laboratory—2 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup.

25. Technical Aspects of Dramatic Production (3)
Lecture—3 hours. Technical principles of dramatic production emphasizing the three areas of scenic, costume and lighting studios. Subjects covered include basic tools, materials and equipment, production practices; and the interdisciplinary and collaborative nature of dramatic production.

26. Performing Arts Production Management (3)
Lecture—3 hours. Theoretical study of performing arts administration and backstage operations from audition through performance. Techniques of scheduling, production management, stage management, technical direction, audience control, box office, promotion, safety, accommodations for persons with disabilities and emergency procedures.—Winn

30. Theatre Laboratory (1-5)
Prerequisite: course 25 or consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to 11 units.—I, II, III. (I, II, III.)

40A. Beginning Modern Dance (2)
Laboratory/discussion—4 hours. Prerequisite: course 14 or consent of instructor. Fundamentals of modern dance focusing primarily on the development of techniques and creative problem solving. Basic anatomy, dance terminology, and a general

overview of modern dance history. May be repeated one time for credit with consent of instructor.—I, II, III. (I, II, III.)

40B. Intermediate Modern Dance (2)
Laboratory/discussion—4 hours. Prerequisite: course 40A. Modern dance techniques. Basic anatomy, dance terminology and a general overview of modern dance history. May be repeated one time for credit with consent of instructor.—I, II, III. (I, II, III.)

41A. Beginning Jazz Dance (2)
Laboratory/discussion—4 hours. Prerequisite: course 14 or consent of instructor. Fundamentals of jazz dance; includes warm-ups, dance techniques and combinations. Basic anatomy, dance terminology and general overview of jazz dance history. May be repeated one time for credit with consent of instructor.

41B. Intermediate Jazz Dance (2)
Laboratory/discussion—4 hours. Prerequisite: course 41A. Warm-ups, dance techniques and combinations at the intermediate level. Basic anatomy, dance terminology and a general overview of jazz styles of historically significant jazz choreographers and leading contemporary jazz choreographers. May be repeated one time for credit with consent of instructor.

42A. Beginning Ballet (2)
Laboratory/discussion—4 hours. Prerequisite: course 14 or consent of instructor. Fundamentals of ballet, focusing on the development of technique through proper alignment, quality, and rhythm. Basic anatomy, ballet terminology, and dance history. May be repeated one time for credit with consent of instructor.—I, II, III. (I, II, III.)

42B. Intermediate Ballet (2)
Laboratory/discussion—4 hours. Prerequisite: course 42A or consent of instructor. Barre and center work at the intermediate level. Development and refinement of technique through proper alignment, rhythmic, and qualitative understanding. Anatomy, ballet terminology, and dance history. May be repeated one time for credit with consent of instructor.—I, II, III. (I, II, III.)

43A. Contact Improvisation Dance (2)
Lecture/laboratory—4 hours. Fundamentals of contact improvisation and its applications to all forms of dance, performance, sports, physical safety and health. Solo improvisation, safety, communication, alignment, basic lifting and weight-sharing, intuition, developing relaxed readiness and personal expression. May be repeated two times for credit. Not offered every year.

43B. Intermediate Contact Improvisation (2)
Lecture/laboratory—4 hours. Prerequisite: course 43A. Building on the fundamentals. Reviewing basics, extended improvising, skillfully working with partners of different sizes and abilities, advanced lifting, advanced safety practices, embracing risk and disorientation, subtle nuances of communication. May be repeated two times for credit.

44A. Beginning Hip Hop Dance (2)
Laboratory/discussion—4 hours. Fundamentals of Hip Hop dance focusing on developing a fluid movement vocabulary, facility in body isolations, intricate rhythmic patterning, quick shifts of weight and mastering dance combinations. Discussions on Hip Hop dance history, styles and terminology. May be repeated one time for credit.

44B. Intermediate Hip Hop Dance (2)
Laboratory/discussion—4 hours. Prerequisite: course 44A or consent of instructor. Expansion of Hip Hop dance vocabulary by focusing on mastering body isolations and intricate rhythmic techniques, complex dance combinations, advanced across the floor sequences. May be repeated one time for credit.

92. Internship in Dramatic Art (1-12)
Prerequisite: consent of instructor and department chairperson; lower division students (less than 84 units completed). Internship outside the Department of Theatre and Dance enabling students to practice their skills. May be repeated for credit up to 12 units. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.)

98. Directed Group Study (1-5)
Primarily for lower division students. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

111S. Representation and Identity in Culture and Cinema (4)
Lecture/discussion—2 hours; film viewing—4 hours. Issues of personal and collective identity via study of film narratives from different cultures. Reflection of dominant cultural identities in film. Taught in Australia. GE credit: ArtHum, Div, Wrt.—McCutcheon

114. Theatre on Film (4)
Lecture/discussion—3 hours; film viewing—2 hours; term paper. Prerequisite: consent of instructor; graduate standing; course 1, 14, 15. Study of six/eight plays on film, using mixed casts and raising issues of diversity. Focus: sociohistorical context for production and reception, interpretation and analysis of topics (gender, ethnicity, age, politics, philosophy), and filming, screenwriting, design, and acting/directing for film. GE Credit: ArtHum or SocSci, Div, Wrt.

115. Advanced Study of Major Film Makers (4)
Lecture/discussion—3 hours; film viewing—2 hours. Prerequisite: course 15. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films. May be repeated for credit when different film creator studied.

121A. Advanced Acting: Mask, Myth, and Tragedy (4)
Lecture/laboratory—6 hours. Prerequisite: course 21B and consent of instructor. Theory and practice of acting focused on the performance skills necessary to enact verse plays. Specific concentration on language as vocal and physical metaphor.

121B. Advanced Acting: Comedy from Farce to Manners (4)
Lecture/laboratory—6 hours. Prerequisite: courses 21B, 121A and consent of instructor. Theory and practice of acting in comic plays. Specific issues addressed will be comic characterization, physical mask, and timing.

122A. Advanced Acting: Realism (4)
Lecture/laboratory—6 hours. Prerequisite: course 21B and consent of instructor. The issues of Stanislavski realism are explored through selected plays. Script analysis using improvisation and emotional scoring.

122B. Advanced Acting: Non-Realism (4)
Lecture/laboratory—6 hours. Prerequisite: courses 21B, 122A and consent of instructor. Exploration of the acting techniques needed to perform a non-realistic script. Different avant-garde movements will be examined through performance of the scripts.

124A. Principles of Theatrical Design: Scenery (4)
Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Scene design processes, working drawings, sketching techniques, scale models, methods and materials of scenery construction.

124B. Principles of Theatrical Design: Scenery (4)
Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays.

124C. Principles of Theatrical Design: Lighting (4)
Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Theories of lighting the stage, equipment and control systems, execution of lighting plots.—Munn

124D. Principles of Theatrical Design: Costume (4)
Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Source materials for theatrical costuming, selecting fabrics, elements of design, analysis of plays in terms of costume design, execution of designs for modern and period plays.—I. (I.)

124E. Costume Design for Film (4)
Lecture/discussion—4 hours. Prerequisite: course 24 or 124D or consent of instructor. Theory and practice of the art and business of film costume design. Script analysis, costume research, developing design concepts, budgeting, and current production practices and methods. Execution of designs for period and contemporary films. Viewing of current films.—II. (II.)

125. Scenic Painting: Studio (4)
Lecture—2 hours; studio—3 hours; laboratory—3 hours. Prerequisite: upper division standing in Dramatic Art, Art Studio, or Design; or course 24 or 25, or consent of instructor. Scene painting techniques, practices and materials. Course satisfies production requirement in studio category. May be repeated one time with consent of instructor. Offered in alternate years.

126. Principles of Performing Arts Stage Management (3)
Lecture/discussion—2 hours; laboratory—3 hours. Prerequisite: course 20, 24, 25, 26 or the equivalent or consent of instructor. Stage management principles for theatre, dance, musical theatre, music, and concerts. The dynamical role of the stage manager in the performing arts, upper-management team.

127A. Principles of Directing (4)
Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 21A, 26; two of 156A, 156B, 156C; or consent of instructor. The director's creative approach to the play and to its staging.

127B. Principles of Directing (4)
Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: course 127A and consent of instructor for non-majors. The director's creative approach to the actor.

128. Principles of Theatre Sound (3)
Lecture/discussion—2 hours; laboratory—3 hours. Fundamentals of sound, sound equipment, and sound design as used in modern theatre and other performance venues. Assembly, set-up, and operation of basic theatre sound reinforcement system, recording system, and theatrical playback system.—Jacobson

130. Approaches to Theatrical Design: Practice and Theory (4)
Seminar—2 hours; studio—4 hours. Prerequisite: upper division standing in Dramatic Art, Art Studio or Design. Advanced scenic design study in specific areas including but not limited to: research, design styles and concepts, new materials and techniques, photography, projections, computer technology, spectacle and special effects, and alternative theatre forms and genres. Course satisfies Dramatic Art production requirement in Design. Offered in alternate years.

135. Voice in Performance (2)
Performance instruction—4 hours. Prerequisite: course 21B or consent of instructor. Progression of exercises to free, develop and strengthen the voice, as a human and then as an actor's instrument with emphasis on how the voice works, to freeing the channel for sound, to interpersonal communication. May be repeated two times for credit.—I. (I.)

140A. Dance Composition (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 40A, 41A, and 42A, or consent of instructor. Introduction to the craft of choreography. Students will compose phrases and present movement studies based on the elements of choreography: motivation, space, time, force/energy.—II. (II.)

140B. Dance Composition (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 140A. Continuation of the study of choreography, focusing on the development of group choreography: duets, trios, quartets and group work, form, and accompaniment.—III. (III.)

140C. Dance Composition (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 140A, 140B. Continuation of study of choreography focusing on sequencing movements for groups. The relation between dance and allied mediums of music, sets, costumes and lighting. Students conceptualize a choreographic issue and explore it through creation of short dance studies.—I. (I.)

141. Introduction to the Fundamentals of Movement (3)
Lecture/discussion—3 hours. Introduction to fundamentals of movement that combines intellectual and kinesthetic understanding of the body's skeletal and muscular systems. Explorations based on theories of body mind specialists Feldenkrais, Bartenieff and Sweigard as well as the eastern discipline of Yoga.

142. History of Modern Dance (5)
Lecture—3 hours; laboratory—3 hours; extensive writing. The Modern Dance tradition in the U.S., focusing on its theorizations of individual and social identity. Students will write and choreograph analyses of principle dances in this tradition. Offered in alternate years.

143. Dance and Movement Studio (1-4)
Laboratory/discussion—2-8 hours. Prerequisite: course 14 or consent of instructor. Special studies in dance and movement such as African, Balinese, Baroque, Chinese, European, and stage combat. Offered as needed for stage productions. May be repeated for credit for a total of 8 units.

144. Introduction to Traditional Chinese Physical Culture (4)
Lecture/discussion—4 hours. Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. GE Credit: ArtHum or SocSci.—II. (II.) Hunter

144B. Introduction to Traditional Chinese Physical Culture (4)
Lecture/discussion—4 hours. Prerequisite: course 144A. Traditional Chinese Wushu practices, explored through practical work in dance laboratory conditions. Integration of practice with conceptual analysis; contemporary social, educational and artistic applications. May be repeated two times for credit if instructor is different, and if student progression requires it. GE Credit: ArtHum or SocSci, Div.—I, II, III, IV. (I, II, III, IV.) Hunter

145. Directed Choreography Projects (4)
Lecture/laboratory—6 hours. Prerequisite: courses 140A, 140B, 140C or consent of instructor. Conceptualization, creation, casting, rehearsing, and concert presentation of complete dances, with students integrating elements of stagecraft and directing the on-stage rehearsals.—Grenke

146A. Professional Track Modern Dance I (3)
Laboratory/discussion—6 hours. Prerequisite: course 40B; consent of instructor. Professionally oriented performance training. Rigorous, consistent training regimen based on traditional modern dance technique. Breath and voice, skeletal and muscular placement, moving from the spine, contraction technique, movement intention. May be repeated two times for credit.—II. (II.)

146B. Professional Track Modern Dance II (3)
Laboratory/discussion—6 hours. Prerequisite: courses 40B and 146A; consent of instructor. Continuous of course 146A. Body and space relationships in solos, duets and group work; stylitic variations of Graham technique; works of Paul Taylor. May be repeated two times for credit.—(III.) (III.)

146C. Professional Track Modern Dance III (3)
Lecture/discussion—6 hours. Prerequisite: courses 40B, 146A, and 146B; consent of instructor. Continuation of course 146B. Time as a theatrical device, sustaining movement and non-movement, phrasing, musicality. May be repeated two times for credit.—Grenke

150. American Theatre and Drama (4)
Lecture—4 hours. The history of the theatre from Colonial times to the present. Readings of selected plays. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

151S. Australian Performance and Culture (4)
Lecture/discussion—2 hours: seminar—2 hours. Australian performance and theatre practices as a product of its culture of origin. Relationships between art and society. Taught in Australia. GE credit: ArtHum.—McCutcheon

154. Asian Theatre and Drama: Contexts and Forms (4)
Lecture/discussion—4 hours. Prerequisite: upper division standing. Selected Asian plays and performance forms in their cultural and artistic contexts; myth, ritual and the theatre; performance training, visual presentation of the text; political theatre; intercultural performance—the fusion of Asian and Western traditions. Offered in alternate years. GE credit: ArtHum, Div, Wrt.—Sellers-Young

155. Representing Race in Performance (4)
Lecture—4 hours. Examination of how "race" is represented and performed in American culture. Course will feature different sub-headings such as "African American Theatre" or "Asian-Americans on Stage." May be repeated one time for credit when topic differs. Offered in alternate years. GE credit: ArtHum, Div, Wrt.

155A. African American Dance and Culture in the United States, Brazil and the Caribbean (4)
Lecture/discussion—4 hours. A comparative study of the African American dance forms in the U.S.A., Brazil, Haiti, Cuba, Jamaica, Barbados, and Trinidad. Examination of ritual, folk, and popular dance forms and the socio/historical factors that have influenced these forms. (Same course as African American and African Studies 155A.) Offered in alternate years.

155B. Ancient and Contemporary Greek Theatre and Dance (6)
Discussion/laboratory—10 hours; performance instruction—10 hours; seminar—13 hours. Origins of early theatres and the first actors, playwrights and dancers and their powerful influence on western performance and thought up to present day. Offered in Greece. GE credit: ArtHum.—IV. (IV.) Shannon

156D. Theatre History through Shakespeare (4)
Lecture—4 hours; writing. Shakespeare's plays, theatre history, and theatre today. European contexts from 1590-2004 and international theatre from 20th century. Stagecraft, different media (print, stage, film), social/political environments, design, and cultural change (gender, sexuality and ethnicity). May be repeated one time for four units of credit. GE Credit: ArtHum, Div., Wrt.—Hunter

156AN. Performance Analysis (4)
Laboratory/discussion—3 hours; discussion—1 hour. Prerequisite: course 1, course 20 or consent of instructor. Analysis of performance on the stage, in the street, in everyday life, ritual, and in politics. Satire, irony, creative protest and performance. Social movements, the state, and performance as tactical intervention. GE Credit: ArtHum, Div, Wrt.—Bogad

156BN. Theatre in History and Place: Local, National and Global Conditions for Production (4)
Laboratory/discussion—3 hours; discussion—1 hour. Prerequisite: course 1, course 20 or consent of instructor. Exploration of local, national and global issues in theatre production, with special attention to historical changes in social and political contexts for performance. GE Credit: ArtHum, Div, Wrt.—Hunter

156CN. Modern Aesthetic Movements in Performance (4)
Laboratory/discussion—3 hours; discussion—1 hour. Prerequisite: course 1, course 20 or consent of instructor. Study of important movements in performance, especially theatre and dance from realism to the present. Primary emphasis on Western traditions though others may be studied. GE Credit: ArtHum, Div, Wrt.—Rossini

158. Performance Studies Undergraduate Seminar (4)
Seminar—4 hours. Prerequisite: course 156A, B, or C, or consent of instructor. Focused inquiry into a particular genre, period, movement, artist, or theme in performance. Philosophical and aesthetic issues as well as historical and cultural performance contexts. In-depth research projects in relationship to the subject of inquiry. May be repeated for credit. GE Credit: Wrt.

159. Contemporary Experimental Performance, Theatre and Drama (4)
Lecture/discussion—4 hours. Evaluation and examination of the "New Theatre"—its experimental and innovative nature since the 1960s. Dance, film, stage, performance art and public acts of a performative nature. Not open for credit to students who have completed course 159S.

159S. Contemporary Experimental Performance, Theatre and Drama (4)
Lecture/discussion—4 hours. Evaluation and examination of the "New Theatre"—its experimental and innovative nature since the 1960s. Dance, film, stage, performance art and public acts of a performative nature. This course is offered in Sydney, Australia. Not open for credit to students who have completed course 159. Not offered every year.—McCutcheon

160A-160B. Principles of Playwriting (4-4)
Lecture/seminar—4 hours. Prerequisite: two courses in Dramatic Art or related courses in other departments; course 160A prerequisite for 160B or consent of instructor. Analysis of dramatic structure; preparation of scenarios; the composition of plays.

170. Media Theatre (3)
Lecture—1 hour; rehearsal—2 hours; performance—1 hour. Prerequisite: upper division standing in Dramatic Art, Music, Art Studio, Design, Computer Science, or Engineering: Computer Science, or consent of instructor. New media and application of theatre design and performance. Emphasis on collaborative process in relationship to integration of emerging technologies and formation of new theatrical works. Development of collaborative performance through lecture, demonstration, improvisation and experimentation. May be repeated one time for credit.

180. Theatre Laboratory (1-5)
Prerequisite: upper division standing and course 25, or consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit.—I, II, III. (I, II, III.)

192. Internships in Theatre and Dance (1-12)
Internship—3-36 hours. Theatre production experience in creative, technical or management areas. Experience in galleries, performance sites, or theatre/dance/physical theatre companies. May be repeated for credit for a total of 12 units. Not open to students who have completed course 192S. (P/NP grading only.)

192S. Internships in Theatre and Dance (1-12)
Internship—3-36 hours. Theatre production experience in creative, technical or management areas. Experience in galleries, performance sites, or theatre/dance/physical theatre companies. This course is offered in Sydney, Australia. May be repeated for

credit for a total of 12 units. Not open to students who have completed course 192. Not offered every year. (P/NP grading only.)—McCutcheon

194HA-194HB. Special Study for Honors Students (3-3)
Independent study—9 hours. Prerequisite: qualification for Letters and Science Honors Program and admission to Dramatic Art Senior Honors Program. Preparation and presentation of a culminating project, under the supervision of an instructor, in one of the creative or scholarly areas of Dramatic Art. (Deferred grading only, pending completion of sequence).

197T. Tutoring in Dramatic Art (1-5)
Tutoring—1-5 hours. Prerequisite: upper division or graduate standing with major in dramatic art; consent of department chairperson. Leading of small voluntary groups affiliated with one of the department's regular courses. May be repeated for credit. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

200. Methods and Materials in Theatre Research (4)
Seminar—3 hours; term paper. Essential research tools in theatre and related fields; bibliographies, primary sources; methods of evaluating and presenting evidence; delineating research areas in the field.

211. Advanced Voice and Speech (3)
Lecture—2 hours; laboratory—2 hours. Prerequisite: advanced senior undergraduate Acting major or graduate student. Open only to Dramatic Arts Students and Ph.D. students with an emphasis in Performance and Theatre. Review a progression of exercises to free, develop and strengthen the voice, first as a human instrument, and then as an actor's instrument using various texts such as Shakespeare, Ibsen and contemporary plays. Required for the M.F.A. degree in Acting. May be repeated two times for credit.—I, IV. (I, IV.) Porter

212. Advanced Stage Movement (3)
Laboratory—6 hours. Prerequisite: graduate standing in the MFA Program. The application of modes of exploration, breath placement, and the use of imagery as well as Laban's effort/shape system as a method of analysis in classic and modern plays. Open to advanced undergraduates by consent of instructor. May be repeated for credit.

221. Special Problems in Advanced Acting (4)
Seminar—2 hours; laboratory—4 hours. Prerequisite: consent of instructor. Advanced acting problems arising from differences in the type and style of plays selected from Greece to the present. May be repeated for credit.

224A. Seminar in Theatrical Design: Ancient Worlds—Early 17th Century (4)
Seminar—2 hours; project—2 hours. Prerequisite: graduate standing. Group study while focusing primarily on one discipline: scenic, costume or lighting design. Periods covered: Greek, Medieval, Renaissance, Shakespearean, Jacobean, early 17th century. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills.—I. (I.) Iacovelli, Morgan, Munn

224B. Seminar in Theatrical Design: Mid 17th Century to 1900 (4)
Seminar—2 hours; project—2 hours. Prerequisite: graduate standing; course 224A or consent of instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Periods covered: Cavalier, Restoration 18th century opera and ballet, 19th century drama. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills.—II. (II.) Iacovelli, Morgan, Munn

224C. Seminar in Theatrical Design: the 20th Century (4)
Seminar—2 hours; project—2 hours. Prerequisite: graduate standing; course 224A and 224B or consent of instructor. Group study focusing primarily on one discipline–scenic, costume or lighting design. 20th century genres covered: Realism, Brecht, Musicals, Contemporary Dance, short narrative film. Design projects include script analysis, research of period style, fashion, character development, developing design concepts, presentation skills.—III. (III.) Iacovelli, Munn

224D. Seminar in Theatrical Design: Contemporary Concepts (4)
Seminar—2 hours; project—2 hours. Prerequisite: graduate standing; course 224A, 224B, and 224C or consent of instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Emphasis on contemporary design concepts for new works and classics: Shakespeare, modern dance, concept plays and musicals. Script and character analysis for design in performance, research, design projects.—I. (I.) Iacovelli, Morgan, Munn

224E. Seminar in Theatrical Design: Advanced Concepts (4)
Seminar—2 hours; project—2 hours. Prerequisite: graduate standing; courses 224A, 224B, 224C, and 224D or consent of instructor. Group study focusing primarily on one discipline: scenic, costume or lighting design. Emphasis on special issues in contemporary design concepts for new works and classics. Script and character analysis for design in performance, research, design projects.—III. (III.) Iacovelli, Morgan, Munn

225. Performance Design Studio: Techniques and Media (2)
Studio—2 hours. Prerequisite: graduate standing; must be taken concurrently with course 224 series. Exploration and development of techniques and skills in the performance design process. Drafting, model building, drawing, painting and rendering, costume drawing, color theory, lighting techniques, design portfolio preparation and presentation. May be repeated up to five times for credit.—I, II, III. (I, II, III.) Iacovelli, Morgan, Munn

228. Seminar in Directing Theory: Non-Realism (4)
Seminar—3 hours; term paper. Modern directing theory as it applies to non-realistic theatre; development of directorial concepts for production of selected non-realistic plays—Greek to the present; emphasis on textual analysis.

229. Special Problems in Directing (5)
Seminar—2 hours; laboratory—2 hours; rehearsal—4 hours. Prerequisite: consent of instructor. Projects in directing scenes selected from plays from ancient Greece to the present. May be repeated for credit.

244. Critical Approaches to Traditional Systems of Body Movement (4)
Discussion/laboratory—6 hours; project; term paper. Introduction to traditional systems for body movement, development of critical approaches to them, and experiments in how they inform training and practice in theatre, dance, and performance. May be repeated five times for credit. Not offered every year.

250. Modern Theatre (4)
Seminar—3 hours; term paper. The theatre of Europe and America, 1860-1940, with emphasis on the relationship of the dramas of the period to the physical circumstances under which they were produced. Offered in alternate years.

251. Scoring and Scripting in Performance (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: graduate standing. The process of weaving together various performance elements brought into play by the artists in their respective disciplines. The "script" is the thread from which the artists' "scores" will layer and transform the "script" into performance for specific time, place, spectators.

252. Performance: Concepts of Space, Place, and Time (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: graduate standing. Innovative theories of creating performance spaces, establishing a sense of place, and communicating the concept of time explored through collaborative interaction. Research includes traditional principles, site-specific spaces and consideration of various tempi from music and movement.

253. Approaches to Collaboration (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: graduate standing. Exploration of different approaches to collaboration among artists in different media and their influence on the creative process.—I.

254. Performing Identities/Personae (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: graduate standing. Historical and contemporary theories of constructing stage identities. Discussion and project collaborations based on theories. Questions of identity related to ethnicity, gender or sexual orientation.

255. Composition in the Arts (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: graduate standing. Examine manner in which specific elements utilized by actors, dancers, directors, choreographers, and designers are combined or related to form a whole in space and time, as well as methods of sequencing used by each discipline to produce artistic products. May be repeated one time for credit.

257. Interdisciplinary Seminar in Theatre, Dance and Performance (4)
Seminar—3 hours; project. Prerequisite: consent of instructor. Interdisciplinary seminar for first and second year MFA students in Dramatic Art. Topics will range from current practice in dance, theatre, film and performance, to leading edge developments by outstanding practitioners in the field. Students must be enrolled on the MFA in Dramatic Art. Students taking the Ph.D. in Performance Studies or the DE in Studies in Performance and Practice may apply to join the class. May be repeated two times for credit.

259. Topics in Contemporary Theatre and Performance (4)
Seminar—3 hours; term paper. Special topics designed to study in depth aspects of contemporary performance including performance analysis, cultural and historical context, modes of production, theoretical and political entailments, and issues of spectatorship (e.g., "Brecht and After," "British Theater," "Race and Gender in Performance." May be repeated five times for credit.

260. Topics in Contemporary Theatre and Performance (4)
Seminar—3 hours; term paper; project. Prerequisite: admission to any graduate program in the University. Preference will be given to students enrolled in the Designated Emphasis in Studies in Performance and Practice. Instruction is offered a variety of disciplinary approaches and methodologies in Performance and Practice, with a focus is on cross-disciplinary learning and research. Usually offered each quarter. Maybe repeated for credit with different topical matter/instructor. Offered irregularly.

265A. Performance Studies: Modes of Production (4)
Seminar—3 hours; term paper; project. Introduces students to the literature of performance production in a variety of media: theatre, dance, film, video, computer-based, looking at cultural, aesthetic, rhetorical and political theory. Offered in alternate years. May be repeated three times for credit when topic differs.

265B. Performance Studies: Signification and the Body (4)
Seminar—3 hours; term paper; project. Introduces students to analysis of the body in performance, drawing on theoretical models from several fields. Offered in alternate years. May be repeated three times for credit when topic differs.

265C. Performance Studies: Performance and Society (4)
Seminar—3 hours; term paper; project. Introduces students to the role of performance (broadly defined), in everyday life, sociopolitical negotiation, identity, social movements, the media, and the state. Offered in alternate years. May be repeated three times for credit when topic differs.

265D. Performance Studies: Theory, History, Criticism (4)
Seminar—3 hours; term paper; project. Introduction to the theory, history and criticism, informing performance studies. Offered in alternate years. May be repeated three times for credit when topic differs.

270A. Individually Guided Research in Performance Studies (4)
Discussion—1 hour; independent study; extensive writing. Prerequisite: course 200; one of courses 265A, B, C, or D; consent of instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus.

270B. Individually Guided Research in Performance Studies (4)
Discussion—1 hour; independent study; extensive writing. Prerequisite: course 200; one of courses 265A, B, C, or D; consent of instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project, to produce a dissertation prospectus.

270C. Individually Guided Research in Performance Studies (4)
Discussion/laboratory—1 hour; fieldwork; term paper. Prerequisite: course 200; one of courses 265A, B, C, or D; consent of instructor. Restricted to students in the Graduate Group PhD in Performance Studies. Individually guided research, under the supervision of a faculty member, on a Performance Studies topic related to the student's proposed dissertation project to produce a dissertation prospectus.

280. Theatre Laboratory (1-12)
Advanced practice in acting, designing, directing, playwriting, and technical theatre. May be repeated for credit.—I, II, III. (I, II, III.)

298. Group Study (1-5)
Prerequisite: consent of instructor.

299. Individual Study (1-12)
(S/U grading only.)

299D. Dissertation Research (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Professional Courses

413. Stage Make-up (1)
Lecture/laboratory—2 hours. Prerequisite: consent of instructor. Approved for graduate degree credit. Lectures, demonstrations, and practical work in aspects of theatrical make-up.

459. Approaches to Theatre and Dance (4)
Seminar—3 hours; term paper; project. Prerequisite: consent of instructor; advanced graduate students. Work on approaches to theatre, dance, film/video, design and performance, with a focus on methodology and professional development. May be repeated five times for credit. Not offered every year.

Transportation Technology and Policy (A Graduate Group)

Patricia L. Mokhtarian, Ph.D., Chairperson of the Group

Group Office. 2028 Academic Surge
(530) 752-0247; *http://www.its.ucdavis.edu*

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James Wilen, Ph.D., Professor *(Agricultural and Resource Economics) Distinguished Graduate Mentoring Award*
Michael Zhang, Ph.D., Professor *(Civil and Environmental Engineering)*

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Dan Chang, Ph.D., Professor Emeritus *(Civil and Environmental Engineering)*
Myron "Mike" Hoffman, Professor Emeritus *(Mechanical and Aerospace Engineering)*
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Andrew F. Burke, Ph.D., Research Engineer *(Institute of Transportation Studies)*
Steven S. Cliff, Ph.D., Research Engineer *(Applied Science)*
Mark A. Delucchi, Ph.D., Research Ecologist *(Institute of Transportation Studies)*
Kenneth S. Kurani, Ph.D., Research Engineer *(Institute of Transportation Studies)*
Alan Meier, Ph.D., Professional Researcher *(Institute of Transportation Studies)*
Marshall Miller, Ph.D., Associate Engineer *(Institute of Transportation Studies)*
Thomas Turrentine, Ph.D., Research Anthropologist *(Institute of Transportation Studies)*
Sonia Yeh, Ph.D., Research Scientist *(Institute of Transportation Studies)*

Graduate Study. The Graduate Group in Transportation Technology and Policy offers the M.S. (Plan I—thesis; and Plan II—exam), and Ph.D. degrees in two areas of specialization: Transportation Technology; and Transportation Planning and Policy. The technology track is for students trained in engineering and the physical sciences and interested in systems-level planning, analysis, management and design of advanced technologies (emphasizing vehicle propulsion and "intelligent transportation system" technologies) focusing on energy and environmental issues. The planning and policy track is aimed at students from a wider range of disciplines interested in the broader public policy issues concerning transportation systems. The curriculum for both tracks includes courses in civil, mechanical, and environmental engineering, economics, policy sciences, statistics, travel behavior, management, technology assessment and environmental studies.

Preparation. Applicants will normally be expected to have completed two courses in calculus, one course in linear algebra, and one course each in calculus level statistics and microeconomics. Additionally, students entering the technology track will need either to have an appropriate technical background or make up a relatively large number of prerequisite courses in order to be able to take the approved courses in that track.

Program of Study. Students will have the option of following either a technology or policy/management track. M.S. students complete 6 core courses plus electives. Ph.D. students take 7 courses from the same core, 3 additional courses from their chosen track, one more in the alternate track, plus electives. Master's degrees require a minimum of 36 quarter units and doctoral degrees require a minimum of 54 units. M.S. Plan I students may replace up to 6 units of regular course work with research (course 299) units. At least two thirds of all credits must be at the graduate level.

Graduate Adviser. P.L. Mokhtarian

Curriculum

Core Courses. Students in each track are required to take courses in a common set of core competencies, as well as (for Ph.D. students) some courses in the other track.

Knowledge areas core courses: M.S. and Ph.D. students take Transportation Technology (TTP 210), Transportation Policy (ECI 252 or

TTP 220), and Transportation Systems (ECI 251).
Skill areas core courses: M.S. and Ph.D. students take one in the area of Research Design from the following: Transportation Survey Methods (TTP 200), Research Methods in Environmental Policy (ESP 278), Survey and Questionnaire Research Methods (PSY 207), Design and Analysis of Engineering Experiments (EBS 265), Experimental Design and Analysis (PLS 205), Engineering Experimentation and Uncertainty Analysis (MAE 207), or Statistical Methods for Research (STA 205);

M.S. and Ph.D. students take one in the area of Economics from the following: Transportation Economics (ECN 145), Microeconomic Analysis (ARE 204), Economic Analysis of Resource and Environmental Policies (ARE 275), Environmental Economics (ARE 276), or Infrastructure Economics (ECI 268);

M.S. students take one and Ph.D. students take two in the area of Transportation Models and Quantitative Methods from the following: Discrete Choice Analysis of Travel Demand (ECI 254), Urban Traffic Management and Control (ECI 256), Transportation-Air Quality: Theory and Practice (ECI 269), Applied Statistical Methods: Regression Analysis (STA 108), Applied Statistical Methods: Analysis of Variance (STA 106), Analysis of Categorical Data (STA 138), Design and Analysis of Engineering Experiments (EBS 265), Multivariate Systems and Modeling (PLS 206), Applied Econometrics (ARE 256), or Psychological Data (PSC 204A, B, C, or D);

Integration and Breadth core courses: M.S. and Ph.D. students take ITS Seminars (TTP 281), Transportation Orientation Seminar (TTP 282), Leadership, and Research (TTP 299).

Planning and Policy Courses. Approved courses in this area include the following; additional courses may be added upon approval by the Chairperson:

Agricultural and Resource Economics, 100B, 130, 136, 144, 175, 176, 204, 275, 276
Anthropology 104N, 127, 211, 222
Civil and Environmental Engineering, 165, 258, 268
Civil and Environmental Engineering/ Environmental Science and Policy 163, 289A
Communication 170
Community and Regional Development 162, 171, 240, 245
Ecology 213
Economics 145
Education 222
Engineering 250
Environmental Horticulture 110
Environmental Science and Policy 163, 167, 168A, 171, 179 212A
Geography 155
History 172
Landscape Architecture 180G, 180L, 180M, 181M, 201, 205, 220
Management 240, 244, 251, 252, 293
Political Science 175, 187, 208
Psychology 155
Sociology 141, 143A, B, 160
Transportation Technology and Policy 200, 210, 220, 281, 282, 283, 292, 289A, 298

Technology Courses. Approved courses in this area include the following; additional courses may be added upon approval by the Chairperson:

Agricultural Management and Rangeland Resources 180
Applied Science Engineering-Davis 116
Applied Science Engineering-Livermore 220A, 220B
Atmospheric Science 116, 270
Biological Systems Engineering 216, 265
Civil and Environmental Engineering 143, 149, 161, 162, 179, 242, 250, 253, 256, 257, 269, 282, 289A (Life Cycle Modeling)
Computer Science Engineering 168
Environmental and Resource Sciences 131, 186
Electrical and Computer Engineering 207
Landscape Architecture 185
Mechanical Engineering 134, 161, 163, 188, 216, 217, 218, 226, 234, 236, 258, 269, 298

Other Courses. Approved courses in this area include the following; additional courses may be added upon approval by the Chairperson:

Agricultural and Resource Economics 106, 155, 252, 253, 254, 255, 256
Agronomy 205, 206
Anthropology 138
Civil and Environmental Engineering 153, 249, 254
Community and Regional Development 151, 151L
Economics 140, 240A, B
Engineering, Applied Science 115
Engineering, Biological Sciences 265
Environmental Science and Policy 278
Graduate School of Management 249
Mathematics 108, 227, 258A, B
Mechanical and Aeronautical Engineering 207
Nutrition 492A
Psychology 204A, B, C, D, 205A, B, C
Sociology 298
Statistics 106, 108, 130, 131A, B, C, 135, 137, 138, 140, 142, 144, 205, 222, 223
Transportation Technology and Policy 200, 292, 396

Courses in Transportation Technology and Policy (TTP)

Graduate Courses

200. Transportation Survey Methods (4)
Lecture—4 hours. Prerequisite: Statistics 13; Civil and Environmental Engineering 251 recommended. Description of types of surveys commonly used in transportation demand modeling, including travel and activity diaries, attitudinal, panel, computer, and stated-response surveys. Discussion of sampling, experimental design, and survey design issues. Analysis methods, including factor, discriminant and cluster analysis. Not open for credit to students who have completed Civil and Environmental Engineering 255.—II. (II.) Mokhtarian

210. Fundamentals of Transportation Technology (4)
Lecture—2 hours; discussion—2 hours. Prerequisite: consent of instructor; Mathematics 21A, 21B, 22A; graduate or junior/senior undergraduate as a technical elective. Limited enrollment. Not open for credit to students who have completed Transportation Technology and Policy; Fundamentals of Transportation Technology 289. (Former course Transportation Technology and Policy; Fundamentals of Transportation Technology 289).—III. (III.) Erickson

220. Transportation Planning and Policy (4)
Lecture/discussion—4 hours. Transportation planning process at the regional level, including the role of federal policy in shaping regional transportation planning, tools and techniques used in regional transportation planning, issues facing regional transportation planning agencies, pros and cons of potential solutions and strategies. Students having taken this course previously as course 289 cannot repeat for credit; having taken other course 289 offerings does not preclude taking this course for credit. Limited enrollment. Offered in alternate years.—III. Handy

281. ITS Transportation Seminar Series (1)
Seminar—1.5 hours. Transportation seminars by guest speakers, on varied topics. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Mokhtarian, Sperling

282. Transportation Orientation Seminar (1)
Seminar—1 hour. Ten weeks of seminars, introducing various topics in transportation research and education, focusing on topics of particular interest at UC Davis. May be repeated for credit. (S/U grading only.)—I. (I.) Handy

283. Professionalism, Leadership, and Ethics (1)
Seminar—2 hours. Speakers from industry, government, academia, and NGOs will lead discussions about succeeding and performing in the professional world. They will address leadership, ethics, and other workplace issues. May be repeated for credit. (S/U grading only.)—III. (III.) Sperling

289A. Selected Topics in Transportation Technology and Policy (1-5)
Lecture and/or laboratory. Prerequisite: consent of instructor. Directed group study of special topics with instruction carried out through lecture or laboratory, or a combination of both. May be repeated for credit.—I, II, III. (I, II, III.)

289B. Selected Topics in Transportation Technology and Policy (1-5)
Lecture and/or laboratory. Prerequisite: consent of instructor. Directed group study of special topics with instruction carried out lecture or laboratory, or a combination of both. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Graduate Research Group Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress, and techniques in transportation. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

292. Internship in Transportation Technology and Policy (1-5)
Prerequisite: second year standing; approval of project prior to period of internship. Supervised work experience in transportation studies. May be repeated for credit if topic differs. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
Discussion—1-5 hours. Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
Discussion—1-12 hours. Prerequisite: consent of instructor. (S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

University of California, Davis Washington Program

Larry Berman, Ph.D., Director and Associate Professor

UC Davis Washington Program,
1608 Rhode Island Avenue NW, Third Floor
Washington, D.C. 20036
(202) 974-6351
http://washingtonprogram.ucdavis.edu

Information.
UC Davis Washington Program On-Campus Office
Internship and Career Center
South Hall, 2nd Floor
(530) 754-5718
http://washingtonprogram.ucdavis.edu

The UC Davis Washington Program provides students and faculty new and expanded opportunities in the nation's capital to enrich their education and research. Its principal activities are an undergraduate academic internship program, fellowships and

internships for graduate and professional school students, fellowships and research grants for faculty, and conferences and workshops organized by UC Davis faculty. The University of California Washington Center resides in an 11-story, state of the art facility in downtown D.C. The center houses the academic and residential programs for undergraduate, faculty, and graduate students participating in the UC Davis Washington Program, as well as those from other UC campuses.

Undergraduate Academic Internship Program

The UC Davis Washington Undergraduate Program is open to students from all majors at UC Davis who have completed 89.9 or more units towards graduation. Students earn 15 units of academic credit, and continue to be registered as full-time students. A GPA of at least 3.000 is recommended for admission although not required. Applicants are also evaluated based on overall relevant experience, a written statement, letters of recommendation and personal interviews.

The Undergraduate Academic Internship Program runs 11 weeks each fall, winter, and spring quarter. It has three principal components:

- **Internship.** *7* units: Students work three to four days per week as interns in Congress, federal agencies, interest groups, trade associations, research institutions, the media, museums or in other organizations related to policy, politics, science and culture and geared to the interests and objectives of individual students.
- **Research Seminar.** 4 units: This is the core academic component of the program. Each student writes a 20-25 page research paper in consultation with Washington Program faculty and graduate fellows. To complete the assignment, students take advantage of the many unique research resources in Washington, DC.
- **Elective Seminar Course.** 4 units: Each student also enrolls in one upper division seminar course taught at the Washington Center. These courses vary each quarter, and are a mix of political science, international relations, history, other social sciences, the arts and humanities, and science policy. In addition to regular instruction, seminars often include guest speakers, observations of congressional committees and federal agencies, and other relevant Washington experiences. UC Davis course equivalencies are established each quarter.

Courses are taught by UC Davis faculty in residence, faculty from the UCLA, UC Santa Barbara, UC Santa Cruz, UC San Diego, UC Berkeley, UC Irvine and UC Riverside programs, or visiting faculty from the Washington area.

Financial aid eligibility is maintained, and the aid package can be adjusted to reflect the additional costs of the program. Some additional financial awards also are offered directly by the Washington Program, including the University of California President's Washington Scholarship, Joyce and Norman Weil Scholarships, and the Blanche and Frank Goldstein Building Bridges Award.

Students reside at the UC Washington Center facility, convenient to public transportation. Arrangements are made to cover health services and other aspects of student life. The program also includes many educational, cultural and historical activities in the Washington area.

Summer Program. The UC Davis Washington Program also operates a 10-week Summer Program. The Summer Program has a credit or non-credit option. The credit option allows students to earn *7* units of academic credit, in addition to working at an internship. Students pay the summer sessions rate per credit hour plus an application fee. The non-credit internship has a program fee. Both options allow students to participate in many educational, cultural, historical and social activities. Some financial assistance is provided but is more limited than for the academic year programs.

The Washington Program also has positions during the academic year for graduate students as Graduate Fellows (combination of a pre-doctoral research fellowship and a teaching assistantship) and Graduate Summer Internships.

Graduation Requirements. All prospective applicants, particularly students who intend to study abroad or in Washington, DC during their senior year, should carefully plan their course programs for Davis and at UCDC in order to satisfy university, college, and major/minor requirements for their degree.

Although units and grade points earned at UCDC are incorporated into the University transcript and GPA, departments and majors retain the right to determine which UCDC courses will be accepted in satisfaction of major and minor requirements.

All degree candidates must meet the University residence requirement. Recognizing the special value of UCDC, the faculty have approved two exceptions to the usual residence requirement for students participating in the Washington Program:

- Students planning to graduate immediately upon completion of participation in UCDC may satisfy the University residence requirement by completing at least 35 of their final 45 units on the Davis campus preceding entry into UCDC
- Students who have not finished all of their degree requirements following completion of their participation in the UCDC program may satisfy the University residence requirement by completing at least 35 units, including at least 12 units after returning from UCDC, on the Davis campus within the final 90 units earned toward the degree.

Students should consult with their college Dean's office early during the UCDC planning process for information on the university residence requirement.

- Students who will not meet the residency requirements outlined may petition their Dean's office requesting an exception to policy.

Students may satisfy GE requirements while at Washington, but should consult with their college Dean's office prior to departure for information on the certification process.

Students with a large number of units may participate in the UCDC program provided that *(1)* they will not exceed 225 units prior to their departure and *(2)* that *all* their degree requirements have been fulfilled either before they leave campus or during their time at UCDC. Participants may only return to campus from UCDC to complete any outstanding degree requirements provided that they can do so within the 225 units.

Courses in UC Davis Washington Center (WAS)

Upper Division Courses

175. Health Policy and Health Politics (4)
Seminar—3 hours; extensive writing or discussion—1 hour. Following the model of a Congressional subcommittee, identification of four salient health policy issues for study, research, and development of model policies to address them. (Same course as Epidemiology and Preventive Medicine 175W.) GE credit: SocSci, Wrt.—III. Wintemute

175W. Health Policy and Health Politics (4)
Seminar—3 hours; extensive writing or discussion—1 hour. Restricted to students attending UC Washington Center program. Following the model of a Congressional subcommittee, identification of four salient health policy issues for study, research, and development of model policies to address them. (Same Course as Public Health Sciences 175.) GE Credit: SocSci, Wrt.—III. (III.) Wintemute

187. Gun Violence (4)
Lecture/discussion—4 hours. Gun violence, viewed from the perspectives of criminology and public health. Topics include personal and societal contributing factors and critical assessment of potential solutions. Offered in alternate years.—III. Wintemute

192. Internship in the UC Davis Washington Center Program (7)
Internship—28 hours. Prerequisite: junior or senior standing, admission in the UC Davis Washington Center undergraduate program, course 193 concurrently. Internship in Washington, DC with associated, supervised research project. (Same course as Political Science 192W.) (P/NP grading only.)—I, II, III. (I, II, III.) Goldman

193. Washington Center Research Seminar (4)
Lecture/discussion—1 hour; independent study—3 hours; tutorial—0.5 hour. Prerequisite: course 192 concurrently. Core academic component of Washington Program. Topics coordinated with internships. Research draws on resources uniquely available in Washington, DC. Supervised preparation of extensive paper. (Same course as Political Science 193W.) GE credit: Wrt.—I, II, III. (I, II, III.) Goldman

University Writing Program

(College of Letters & Science)

Christopher J. Thaiss, Program Director

Program Office. 109 Voorhies Hall
(530) 752-6283; *http://program.ucdavis.edu*

Committee in Charge

Don Abbott, Ph.D. *(English)*
Rebekka Andersen, Ph.D.
(University Writing Program)
Marlene Clarke, Ph.D. *(University Writing Program)*
Dana Ferris, Ph.D. *(English)*
Joseph Kiskis, Ph.D. *(Physics)*
Don Meisenheimer, Ph.D.
(University Writing Program)
Sarah Perrault, Ph.D. *(University Writing Program)*
Vai Ramanathan, Ph.D. *(Linguistics)*
Christopher J. Thaiss, Ph.D.
(University Writing Program)
Carl W. Whithaus, Ph.D.
(University Writing Program)

Faculty

Rebekka Andersen, Ph.D., Assistant Professor
Dana R. Ferris, Ph.D., Associate Professor
Sarah Perrault, Ph.D., Assistant Professor
Christopher J. Thaiss., Ph.D., Professor
Carl W. Whithaus, Ph.D., Associate Professor

Affiliated Faculty

Cynthia J. Bates, M.A., Lecturer
Mary E. Bly, M.A., Lecturer
John Boe, Ph.D., Lecturer
Academic Federation Excellence in Teaching Award
Amy Clarke, Ph.D., Lecturer
Marlene B. Clarke, Ph.D., Lecturer
Academic Federation Excellence in Teaching Award
Mardena E. Creek-Michelson, Ph.D., Lecturer
Pamela Demory, Ph.D., Lecturer
Aliki Dragona, Ph.D., Lecturer
Academic Federation Excellence in Teaching Award
Dale B. Flynn, Ph.D., Lecturer
Laurie Glover, Ph.D., Lecturer
Gary S. Goodman, Ph.D., Lecturer
Jared Haynes, M.A., Lecturer
Academic Federation Excellence in Teaching Award
Scott R. Herring, Ph.D., Lecturer
Brad J. Henderson, Ph.D., Lecturer
Donald B. Johns, Ph.D., Lecturer
Academic Federation Excellence in Teaching Award
Andy Jones, Ph.D., Lecturer
Stephen Magagnini, B.A., Lecturer
Pamela J. Major, Ph.D., Lecturer
James McElroy, Ph.D., Lecturer

Don Meisenheimer, Ph.D., Lecturer
Janet L. Papale, M.A., Lecturer
Academic Federation Excellence in Teaching Award
Raquel Scherr, Ph.D., Lecturer
Academic Federation Excellence in Teaching Award
Eric J. Schroeder, Ph.D., Lecturer
Academic Federation Excellence in Teaching Award
Victor Squitieri, Ph.D., Lecturer
Academic Federation Excellence in Teaching Award
John Stenzel, Ph.D., Lecturer
Academic Federation Excellence in Teaching Award

The Program

The University Writing Program (UWP) offers writing courses and seeks to improve writing instruction across campus through a variety of programs. The UWP coordinates first year, intermediate, and advanced writing courses that satisfy college composition requirements and offers courses in writing across the curriculum, writing in specific disciplines, and writing in the professions. The Expository Writing Minor serves students from all majors who are planning careers as professional writers or editors, as well as those whose academic and professional careers demand advanced writing skills. The Program offers graduate courses in the teaching of writing and in composition theory, history, and research. The Designated Emphasis in Writing, Rhetoric, and Composition Studies offers Ph.D. students in affiliated programs the opportunity to prepare for leadership roles in writing research, teaching, and program administration. The UWP also administers the English Composition Examination, an alternative way to satisfy the advanced writing requirement. The UWP publishes an annual anthology of exemplary student writing, Prized Writing, and a journal for writing instructors, Writing on the Edge. The Writing in the Disciplines Workshop Program presents workshops on teaching writing for faculty and TAs and workshops on writing for students. The Writing Ambassadors Program trains advanced undergraduates and places them as interns in K-12 classrooms to improve writing instruction.

Minor Program Requirements:

UNITS

Expository Writing..... 20

One course from each of the following four groups: 16
Group A: English 100NF, Nematology 150, University Writing Program 101, 102A, 102B, 102C, 102D, 102E, 102F, 102G, 102H, 102I, 102J, 102K
Group B: Sociology 189, University Writing Program 104A, 104B, 104C, 104D, 104E, 104F, 104I
Group C: Anthropology 119, Classics 110, Communication 105, 152, English 105, English/Linguistics 106, History 101, Philosophy 137A, 137B, 137C, Technocultural Studies 191
Group D: University Writing Program 192 (or equivalent)

Additional units to achieve a total of 20 upper division units..... 4
One additional course from Groups A, B, or C above.

Note: At least twelve units must be from University Writing Program courses.

Courses in University Writing Program (UWP)

Lower Division Courses

1. Expository Writing (4)
Lecture/discussion—4 hours. Prerequisite: completion of Entry Level Writing requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments. Not open for credit to students who have completed English 1. GE credit: Wrt.—I, II, III, IV. (I, II, III, IV.)

18. Style in the Essay (4)
Lecture/discussion—4 hours. Prerequisite: course 1 or English 3 or the equivalent. Style, language, and structure in the essay. Analyzing style, developing a voice in writing, revising sentences, developing effective paragraphs and arguments, and writing with force and clarity. Not open for credit to students who have completed English 18. GE credit: Wrt.—I, II, III. (I, II, III.)

19. Writing Research Papers (4)
Lecture/discussion—4 hours. Prerequisite: course 1 or English 3 or the equivalent. Critical reading, analysis, documentation, and writing research-based assignments. Formulation of research topics and development of effective arguments. Reading and writing assignments may focus on a single theme. Not open for credit to students who have completed English 19. GE Credit: Wrt.—I, II. (I, II.)

92. Internship in Writing (1-12)
Internship—3-36 hours. Prerequisite: course 1 or English 3. Internships in fields where students can practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.)

98. Directed Group Study (1-5)
Prerequisite: course 1 or English 3 or the equivalent; consent of instructor. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: course 1 or English 3 or the equivalent; consent of instructor. (P/NP grading only.)

Upper Division Courses

101. Advanced Composition (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Instruction in advanced principles of expository writing. Writing tasks within and beyond the University. Different writing modes, including narrative, analysis, explanation, argument, critique. Not open for credit to students who have completed English 101. GE Credit: Wrt.—I, II, III, IV. (I, II, III, IV.)

102A. Writing in the Disciplines: Special Topics (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing; restricted to majors or to students concurrently enrolled in an upper division course in a specific academic discipline or interdisciplinary field. Advanced instruction in writing in that discipline and practice in effective styles of communication. May be repeated for credit when topic differs. Not open for credit to students who have completed English 102A or course 102A in the same academic field. Offered irregularly. GE credit: Wrt.

102B. Writing in the Disciplines: Biology (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent; upper division standing; open to majors in a biological science or to students concurrently enrolled in an upper division biological science course. Advanced instruction in writing in biology. Not open for credit to students who have completed English 102B. GE credit: Wrt.—I, II, III. (I, II, III.)

102C. Writing in the Disciplines: History (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent; upper division standing; open to majors in history or to students concurrently enrolled in an upper division course accepted for the history major. Advanced instruction in writing in history. Not open for credit to students who have completed English 102C. GE credit: Wrt.—II. (II.)

102D. Writing in the Disciplines: International Relations (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent; upper division standing.Open to majors in international relations or to students concurrently enrolled in an upper division course accepted for the major. Advanced instruction in writing in international relations. Not open for credit to students who have completed English 102D. GE credit: Wrt.—II. (II.)

102E. Writing in the Disciplines: Engineering (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent; upper division standing. Open to upper division students in the College of Engineering and to students enrolled in an upper division engineering or computer science course for the major. Advanced instruction in writing in the discipline of engineering. Not open for credit to students who have completed English 102E. GE credit: Wrt.—I, II, III. (I, II, III.)

102F. Writing in the Disciplines: Food Science and Technology (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent; upper division standing. Open to majors in food science and technology and to students concurrently enrolled in an upper division course in food science and technology. Advanced instruction in writing in food science and technology. Not open for credit to students who have completed English 102F. GE credit: Wrt.—III. (III.)

102G. Writing in the Disciplines: Environmental Writing (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent; upper division standing; restricted to students with upper division coursework with an environmental focus. Advanced instruction in writing and practice in effective styles of communication in the fields of environmental study, policy, or advocacy. Not open for credit to students who have completed English 102A or course 102A in the same academic field. Not offered every year. GE credit: Wrt.—III. (III.)

102H. Writing in the Disciplines: Human Development and Psychology (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing; restricted to majors and minors or to students concurrently enrolled in an upper division course in Human Development or Psychology. Advanced instruction in writing and practice in effective styles of communication in Human Development and Psychology. Not open for credit to students who have completed English 102A or course 102A in the same academic field. GE credit: Wrt.—I. (I.)

102I. Writing in the Disciplines: Ethnic Studies (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing; restricted to majors and minors in ethnic studies, or students with upper division coursework focusing on race and ethnicity. Advanced instruction in cross-disciplinary writing about race and ethnicity and practice in effective styles of communication. Not open for credit to students who have completed English 102A or course 102A in the same academic field. GE credit: Wrt.—I. (I.)

102J. Writing in the Disciplines: Fine Arts (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing; restricted to majors and minors or to students concurrently enrolled in an upper division course in Art History, Art Studio, Design, Music, or Theater and Dance. Advanced instruction in writing about the arts and practice in effective styles of communication. Not open for credit to students who have completed English 102A or course 102A in the same academic field. GE credit: Wrt.—I, III. (I, III.)

102K. Writing in the Disciplines: Sociology (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing; restricted to majors and minors in Sociology or to students concurrently enrolled in an upper division Sociology course. Advanced instruction in writing and practice in effective styles of communication in Sociology and related academic and professional fields. Not open

for credit to students who have completed English 102A or course 102A in the same academic field. GE credit: Wrt.—III. (III.)

102L. Writing in the Disciplines: Film Studies (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent and upper division standing. Open to majors and minors or to students concurrently enrolled in an upper division course in Film Studies, Technocultural Studies, English, American Studies, or any other upper division course that includes the analysis and understanding of film as a medium. Advanced instruction in writing about film and practice in effective styles of communication. Not open for credit to students who have completed course 102A in the same academic field. GE credit: Wrt.—II. (II.)

104A. Writing in the Professions: Business Reports and Technical Communication (4)
Lecture/discussion—3 hours. Prerequisite: course 1 or English 3 or the equivalent; upper division standing. Designing, writing, and documenting business and technical reports. Presenting data graphically. Suitable for students planning careers in science, government, business, engineering, or industry. Not open for credit to students who have completed English 104A. GE credit: Wrt.—I, II, III. (I, II, III.)

104B. Writing in the Professions: Law (4)
Lecture/discussion—3 hours. Prerequisite: course 1 or English 3 or the equivalent; upper division standing. Advanced principles of critical thinking, argumentation, and style, with special emphasis on their application in the legal profession. Suitable for students planning careers in law, business, administration, or management. Not open for credit to students who have completed English 104B. GE credit: Wrt.—I, II, III. (I, II, III.)

104C. Writing in the Professions: Journalism (4)
Lecture/discussion—3 hours. Prerequisite: course 1 or English 3 or the equivalent; upper division standing. Non-fiction for magazines and newspapers, with attention to style and language. Emphasis on research, interviewing, market analysis, and query letters. Not open for credit to students who have completed English 104C. GE credit: Wrt.—I, II, III. (I, II, III.)

104D. Writing in the Professions: Elementary and Secondary Education (4)
Lecture/discussion—3 hours. Prerequisite: course 1 or English 3 or the equivalent; upper division standing. Advanced expository writing in the contemporary American classroom. Strongly recommended for teaching credential candidates. Not open for credit to students who have completed English 104D. GE credit: Wrt.—I, II, III. (I, II, III.)

104E. Writing in the Professions: Science (4)
Lecture/discussion—3 hours. Prerequisite: course 1 or English 3 or the equivalent; upper division standing or enrollment in a graduate science curriculum. Writing abstracts, research proposals, scientific papers, other forms of scientific communication. Presenting data graphically. Primarily for students engaged in or planning careers in basic or applied research. Not open for credit to students who have completed English 104E. GE credit: Wrt.—I, II, III. (I, II, III.)

104F. Writing in the Professions: Health (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: course 1 or English 3 or the equivalent; upper division standing. Advanced expository writing common in the health professions, emphasizing effective communication between the writer and different audiences. Topics relate to health, disability, and disease. Suitable for students planning careers in professions such as medicine, dentistry, physical therapy, optometry. Not open for credit to students who have completed English 104F. GE credit: Wrt.—I, II, III. (I, II, III.)

104I. Writing in the Professions: Internships (4)
Lecture/discussion—3 hours. Prerequisite: course 1 or English 3 or the equivalent and upper division standing; restricted to students concurrently enrolled in an internship and to Contemporary Leadership minors. Advanced instruction in writing in the workplace, including public and private sectors, government agencies, profit and non-profit organizations. Collaborative work and practice in effective styles of communication. Not open for credit to students who have completed English 102A or course 102A. GE credit: Wrt.—III. (III.)

110. Specialized Genres in Professional Writing (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: satisfaction of the upper-division writing requirement. Restricted to upper-division students who have satisfied the upper-division writing requirement. Counts toward the writing minor. Instruction in the elements and practices of professional writing in specialized genres. Offered irregularly. GE credit: Wrt.

111A. Specialized Topics in Journalism (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: satisfaction of the upper-division writing requirement. Restricted to upper-division students with a strong interest in journalism. Counts toward the writing minor. Instruction in the elements and practices of advanced journalism. May be repeated one time for credit if specialized journalism topic for each course differs. Offered irregularly. GE credit: Wrt.

111B. Specialized Topics in Journalism: Investigative Journalism (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: satisfaction of the upper-division writing requirement. Restricted to upper-division students with a strong interest in journalism; counts toward the writing minor. Instruction in the elements and practices of in-depth investigative journalism. Offered in alternate years. GE credit: Wrt.—(II.)

111C. Specialized Topics in Journalism: Science Journalism (4)
Lecture/discussion—3 hours; extensive writing. Prerequisite: satisfaction of the upper-division writing requirement. Restricted to upper-division students with a strong interest in journalism. Counts toward the writing minor. Instruction in the elements and practices of science journalism. Offered in alternate years. GE credit: Wrt.—II.

192. Internship in Writing (1-12)
Internship—3-36 hours. Prerequisite: course 1 or English 3 or the equivalent. Internships in fields where students can practice their skills. May be repeated up to 12 units for credit. (P/NP grading only.)

197T. Tutoring in Writing (1-5)
Tutoring—1-5 hours. Prerequisite: upper division standing; consent of instructor. Tutoring one-on-one or leading small voluntary discussion groups affiliated with a writing course. May be repeated up to 10 units for credit. (P/NP grading only.)

197TC. Community Tutoring in Writing (1-4)
Tutoring—1-4 hours. Prerequisite: upper division standing; consent of instructor. Field experience, with individuals or in K-12 classroom instruction, focusing on reading- and writing-to-learn strategies in any subject area. May be repeated up to 10 units for credit. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: course 1 or English 3 or the equivalent; consent of instructor. May be repeated up to 10 units for credit. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

298. Directed Group Study (1-5)
Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

299. Individual Study (1-12)
Prerequisite: consent of instructor; graduate standing. (S/U grading only.)

Professional Courses

390. Theory and Practice of University-Level Composition Instruction (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing; appointment as Teaching Assistant in the Composition Program. Examination of current theories about the teaching of writing and their practical application to undergraduate writing courses at UC Davis. Not open for credit to students who have completed English 390. (S/U grading only.)—III. (III.)

392. Teaching Expository Writing (2)
Discussion—2 hours. Prerequisite: graduate standing, appointment as Teaching Assistant in the Composition Program; completion of course 390 or the equivalent. Discussion of problems related to teaching expository writing at the university level, with special emphasis on teaching reading and writing skills and responding to student papers. (S/U grading only.)—I. (I.)

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing; consent of instructor. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

Urban Planning

See Environmental Science and Policy, on page 290.

Urology

See Medicine, School of, on page 380.

Vegetable Crops

See Plant Sciences, on page 461.

Veterinary Medicine, School of

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Veterinary Medicine (VMD)

Lower Division Course

92. Internship in Veterinary Science (1-12)
Discussion/laboratory—1-4 hours; clinical experience—3-36 hours. Prerequisite: approval of project by faculty sponsor prior to period of internship. Students in this program will be under the supervision of faculty in the School of Veterinary Medicine whose expertise is appropriate for the proposed project. (P/NP grading only.)—I, II, III, IV. (I, II, III, IV.) Ilkiw

Upper Division Courses

192. Internship in Veterinary Science (1-12)
Discussion/laboratory and clinic—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in veterinary medicine. (P/NP grading only.) Ilkiw

Graduate Courses

298. Group Study (1-5)
Prerequisite: consent of instructor.
(S/U grading only.)

299. Research (1-12)
Prerequisite: consent of instructor.
(S/U grading only.)

Professional Courses

400A. Freshman Doctoring (2.5)
Lecture—11 sessions; laboratory—3 sessions; workshop—5 sessions; lecture/discussion—6 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Introduction to the "art" of veterinary medicine, focusing on essential skills (communication, team-building, leadership, conflict management, stress management, financial management). Emphasis on practical application of these skills to function efficiently and effectively in practice, academia, industry, government or other career. (S/U grading only.)—I. (I.)

400B. Sophomore Doctoring (2.6)
Lecture—8 sessions; lecture/discussion—10 sessions; project—3 sessions; laboratory—5 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Further the development of new technical skills that will prepare students for lifelong learning and successful veterinary practice management. Emphasis will be on hands-on learning through participation. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.)

400C. Junior Doctoring (1.8)
Lecture—3 sessions; laboratory—2 sessions; lecture/discussion—10 sessions; project—3 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine Introduction to the "art" of veteri-

nary medicine, focusing on essential skills (communication, team-building, leadership, conflict management, stress management, financial management). Emphasis on practical application of these skills to function efficiently and effectively in practice, academia, industry, government or other career. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.)

401A. The Normal Anatomy of the Canine Locomotor System (3.4)
Lecture—16 sessions; laboratory—18 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Normal canine anatomy of bones, joints, muscles, ligaments, tendons, nerves and vessels of the vertebral column and limbs; musculoskeletal physiology and biomechanics.—I. (I.) Meyers

401B. The Normal Anatomy of the Canine Head (1.7)
Lecture—7 sessions; laboratory—8 sessions; discussion—2 sessions. Prerequisite: first-year standing the School of Veterinary Medicine. Normal canine anatomy with comparison to other species of bones, joints, muscles, ligaments, tendons, nerves and vessels of the head including the eye and ear.—II. (II.) Kasper

402A. Cardiovascular Anatomy (0.7)
Lecture—4 sessions; laboratory—3 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Cardiovascular anatomy.—I. (I.) Pinkerton

402B. Cardiovascular Physiology (1.7)
Lecture—13 sessions; laboratory—4 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Integrated view of cardiovascular physiology.—II. (II.) Jones

402C. Respiratory Anatomy and Physiology (2)
Lecture—15 sessions; laboratory—5 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Integrated view of respiratory anatomy and physiology.—II. (II.) Barter

402D. Structure and Function of the Urinary System and Body Fluids (2.3)
Lecture—17 sessions; laboratory—6 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Basic understanding of the structure and function of the urinary system plus physiology of body fluids and acid-base balance. Structure and function are correlated.—III. (III.) Schelegle

403. Physiological Chemistry (5.1)
Lecture—44 sessions; discussion—7 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Biochemical principles used to analyze problems and to evaluate metabolic relationships important in animal health and pathophysiology. Integrative approach, emphasizing controls of major metabolic pathways, molecular basis of gene expression, tumorigenesis and signal transduction.—I. (I.) Cortopassi

405. Veterinary Parasitology (3.6)
Lecture—26 sessions; laboratory—10 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Biological and clinical aspects of parasites and the diseases they cause in animals.—III. (III.) Conrad, Boyce

406. Principles of Behavior (0.7)
Lecture—7 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Overview of animal behavior with relevance to veterinary medicine.—I. (I.) Bain

407. Principles and Techniques of Operative Surgery and Anesthesia (2.4)
Lecture—24 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Introduction to operative and anesthetic skills and foundation in the importance of regional anatomy in the planning and conduct of surgical practice.—I. (I.) J. Pascoe, Ilkiw

407L. Principles and Techniques of Surgery and Anesthesia Laboratory (1.4)
Laboratory—14 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Introduction to surgical anatomy, operative and anesthetic skills. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.) J. Pascoe, Ilkiw

408. Nutrition and Nutritional Diseases in Animals (2.9)
Lecture—27 sessions; laboratory—2 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Principles of nutrition and their application to the solution of nutritional disorders of animals.—II. (II.) Ramsey

409. Epidemiology (1.7)
Lecture—11 sessions; discussion—6 sessions. Prerequisite: first-year standing in School of Veterinary Medicine. Introduction to epidemiologic effect measures, causal inference, experimental and non-experimental study design, and clinical epidemiology, with applications in veterinary medicine.—I. (I.) Kass

412. Fundamentals of Zoonoses (1.1)
Lecture—11 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Major zoonotic infections transmitted mainly by domestic animals, especially pets and particularly in North America. A short review of symptoms in animals and humans, epidemiology, diagnostic tests, treatment and prevention will be presented for each animal species and each infection or infestation. Some zoonotic diseases, subject to USDA rules and regulations, will be studied in more detail (i.e., rabies, brucellosis, tuberculosis, avian chlamydiosis).—III. (III.) Chomel

413. Veterinary Food Safety (1.3)
Lecture—13 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. The food system and diseases transmitted by food. Topics include sources of contaminants, the function of processing in food safety, and the role of veterinarians in pre-harvest food safety and in food protection in general.—III. (III.) Weimer

414A. Principles of Veterinary Pharmacology and Toxicology (2.5)
Lecture—20 sessions; discussion—4 sessions; laboratory—1 session. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to the principles of pharmacology and toxicology. Pharmaco-/toxicokinetics, pharmaco-/toxicodynamics and chemotherapy of bacterial, neoplastic, fungal and viral diseases.—I. (I.) Buckpitt

414B. Veterinary Pharmacology (2.5)
Lecture—23 sessions; discussion—2 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Basic principles for the use of drugs affecting the autonomic and central nervous systems as well as compounds affecting the cardiovascular system.—II (II.) Vulliet

414C. Veterinary Toxicology (1.9)
Lecture—16 sessions; discussion—2 sessions; laboratory—1 session. Prerequisite: second-year standing in the School of Veterinary Medicine. Toxicants of major importance in veterinary medicine. Basic principles and mechanism of action of toxicants, therapeutic and diagnostic approach.—III. (III.) Puschner

415A. Freshman Clinical Skills (1.1)
Lecture—1 session; laboratory—10 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Development of clinical skills by learning procedures that are important to the practice of veterinary medicine in a variety of species in both a laboratory and clinical environment. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.) Ilkiw

415B. Sophomore Clinical Skills (1.2)
Lecture—1 session; laboratory—11 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Development of clinical skills by learning procedures that are important to the practice of veterinary medicine in a variety of species in both a laboratory and clinical environment. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.) Ilkiw

415C. Junior Clinical Skills (1.9)
Lecture—1 session; laboratory—18 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Development of clinical skills by learning procedures that are important to the practice of veterinary medicine in a variety of species in both a laboratory and clinical environment. (Deferred grading only, pending completion of sequence. S/U grading only.)—I, II, III. (I, II, III.) Ilkiw

419. Virology (2.7)
Lecture—27 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to the classification, morphology, and the strategy of replication of animal viruses, covering the molecular pathogenesis of animal viruses at the cellular level with emphasis on agents of infectious diseases of domestic animals.—I. (I.) Yilma

420. Immunology (3)
Lecture—21 sessions; laboratory—9 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Approved for graduate degree credit. Concepts of immunology. Emphasis is on the principles of vaccination, responses to pathogenic agents, and the development of hypersensitivity and autoimmune reactions.—III. (III.) Gershwin

421. Principles of Neurosciences (2.7)
Lecture—22 sessions; laboratory—5 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. An integrated study of normal neurobiology, neuroanatomy and neurophysiology, to enable students to engage in studies of neurologic disorders and clinical neurology.—II. (II.) LeCouteur

422. Veterinary Ophthalmology (1.9)
Lecture—17 sessions; laboratory—2 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. The eye and related structures. Basic anatomy and physiology with clinically relevant aspects emphasized. Presentation of clinical appearance of common pathological changes. Specific diseases frequently encountered in general practice, including signs, causes, diagnostic approach, and treatment philosophy.—II. (II.) Hollingsworth

425. Veterinary Genetics (1.8)
Lecture—16 sessions; discussion—2 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Introduction to genetics as it applies to the practice of veterinary medicine.—III. (III.) Bannasch, Lyons

426. Principles of Veterinary Anesthesiology and Critical Patient Care (1.7)
Lecture—15 sessions; laboratory—2 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Basic principles of veterinary anesthesiology including techniques of monitoring and management of animals under anesthesia.—III. (III.) P. Pascoe

427. Cell and Tissue Structure and Function (3.3)
Lecture—24 sessions; laboratory—9 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Relationship between structure and function of animal tissues, emphasizing the molecular and cellular processes which integrate normal physiological activity. Mechanisms of cell division, differentiation and locomotion. Microscopic anatomy and organization of cells and extracellular molecules to form specialized differentiated tissues.—I. (I.) Tablin

430. Principles of Radiography and Radiologic Interpretation (3.6)
Lecture—24 sessions; laboratory—2 sessions; discussion—10 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Physical principles of x-ray production and x-ray matter interactions as they pertain to diagnostic medical imaging and radiation safety. Principles of radiologic interpretation. Principles of ultrasound physics and interpretation. (Deferred grading only, pending completion of sequence.)—I, II, III. (I, II, III.) Wisner

431. Endocrinology (1.8)
Lecture—17 sessions; laboratory—1 session. Prerequisite: first-year standing in the School of Veterinary Medicine. The structure and function of endocrine glands and how hormones and cytokines influence physiological processes.—III. (III.) Raybould

432. Normal Gastrointestinal System (2.9)
Lecture—20 sessions; laboratory—9 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Basic understanding and correlation of the structure and function of the gastrointestinal system. Multiple species' differences examined.—II. (II.) Lloyd

433. Veterinary Oncology (1.2)
Lecture—12 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Relationships between pathology, hematology, cytology, immunology, and the clinical manifestations of neoplastic diseases in animals.—I. (I.) Kent

434. Introduction to Veterinary Hematology (1.4)
Lecture—10 sessions; laboratory—4 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. The regulation of production of blood cells, the morphology of bone marrow and hematopoietic cells, the morphology and function of blood cells and the activities of hemostasis.—III. (III.) W. Vernau

435. Veterinary Clinical Pathology (3.9)
Lecture—13 sessions; laboratory/discussion—26 sessions. Prerequisite: second-year standing in School of Veterinary Medicine. The principles, selection, use, interpretation, and limitations of laboratory tests used for the diagnosis and monitoring of disease in animals. (Deferred grading only, pending completion of sequence.)—II, III. (I, III.) Borjesson

436. Veterinary Ethics and Law (1.2)
Discussion—12 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Ethical and legal issues critical to successful and ethical veterinary practice. Processes through which ethical and legal questions are approached and resolved. Background reading materials and discussions are supplemented with problem-based learning. (Deferred grading only, pending completion of sequence.)—I, II. (I, II.) Tannenbaum

437. Veterinary Ethics and Law (2)
Lecture—16 sessions; discussion—4 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Ethical and legal issues critical to successful and ethical veterinary practice. Processes through which ethical and legal questions are approached and resolved. Reading and discussions supplemented with problem-based learning.—III. (III.) Tannenbaum

440. Veterinary Neurology (2.7)
Lecture—21 sessions; laboratory—6 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Integrated study of the relationship between microanatomy, neurophysiology, neuropathology, and the clinical manifestations and diagnosis of neurological diseases, and the use of the various neurodiagnostic aids.—I. (I.) Dickinson

444. Clinical Endocrinology (1.5)
Lecture—12 sessions; discussion—3 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. A correlated review of common endocrinology disorders affecting the dog and cat.—II. (II.) Feldman

446. Veterinary Reproduction (4.2)
Lecture—32 sessions; laboratory—10 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Structural, functional, pathological, and clinical aspects of reproduction in animals.—II. (II.) Conley

447. Introduction to Public Veterinary Practice and Foreign Animal Diseases (1)
Lecture—10 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Overview of the importance of foreign animal diseases and the veterinary responsibilities associated with the prevention, detection and reporting of these diseases in the United States.—I. (I.) Crossley

451. Veterinary Bacteriology and Mycology (4.9)
Lecture—34 sessions; laboratory—15 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to the bacterial and fungal agents of animal diseases. Specifically, each microorganism will be discussed with respect to overall significance to animal disease; structural and functional aspects including morphology, cellular composition, and products of medical interest.—I. (I.) LeFebvre

452. General Pathology (3.1)
Lecture—18 sessions; laboratory—13 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Basic principles of disease and in particular the fundamental mechanisms responsible for creating a disease situation. Illustrations of how the application of general pathological principles is used to determine disease pathogenesis and prognosis.—I. (I.) Mohr

459. Systemic Pathology (5.4)
Lecture—44 sessions; laboratory—10 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor; approved for graduate degree credit. Basic understanding of the pathobiology of major organ systems relevant to a variety of animal species. Emphasis on mechanisms of injury, patterns of response to injury, and balance between damage and repair.—II. (II.) Murphy

460. Fundamentals of Clinical Orthopedics (1)
Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and consent of instructor. Fundamental concepts of veterinary orthopedics, including differentials of bone disease, diagnostics for bone disease, bone biomechanics, principles of fracture repair, applied joint anatomy, principles of joint disease, applied tendon and ligament anatomy, and principles of tendon and ligament disease.—I. (I.) MacDonald

Doctor of Veterinary Medicine (DVM)

Professional Courses

449. Externship (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Approved program of study to receive training and experience outside the School of Veterinary Medicine. Opportunities include private practice and provide students with first-hand experiences in diagnostic and therapeutic capabilities and management and business methods in the private sector.—I, II, III, IV. (I, II, III, IV.) Ilkiw

450. Cardiology (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Diagnostic techniques of history taking, cardiac physical examination, electrocardiography, radiography, echocardiography, and cardiac catheterization and medical, interventional, and surgical therapy of cardiac disorders will be taught along with the etiology and pathophysiology of various cardiac disorders.—I, II, III, IV. (I, II, III, IV.) Kittleson

451. Clinical Pathology (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Focus on the practical use and application of laboratory testing in a practice setting to facilitate optimal management of patients.—I, II, III, IV. (I, II, III, IV.) Borjesson

452. Small Animal Community Practice (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Opportunity to practice wellness care in pediatric and adult patients, address medical management of geriatric patients, and develop a practical, problem-oriented approach to routine medical issues presenting in general practice.—I, II, III, IV. (I, II, III, IV.) Meadows

453. Small Animal Community Surgery—Gourley (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. General surgery service to include instruction in physical exams, basic anesthesia, pain management and routine surgeries. Sample surgeries include routine spays and neuters, cystotomy, mass removal, digit amputation, enucleation, etc.—I, II, III, IV. (I, II, III, IV.) Montgomery

454. Companion Avian and Exotic Pet Medicine (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Basic components of husbandry, nutrition, handling, diseases, medical and surgical treatment of companion exotics including avian (companion and wildlife), small exotic mammal, reptilian, amphibian and aquatic animal patients.—I, II, III, IV. (I, II, III, IV.) Hawkins

455. Dentistry (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Examination, diagnosis and treatment of small animals presenting with oral or dental diseases.—I, II, III, IV. (I, II, III, IV.) Verstraete

456. Dermatology (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Exposure to veterinary dermatology. Learn the importance of obtaining a good history, performing a good physical examination and characterizing lesions. The use of various diagnostic and therapeutic techniques specific to dermatology will be demonstrated.—I, II, III, IV. (I, II, III, IV.) Ihrke

457. Equine Surgery ICU (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Understanding the diagnosis and medical and surgical treatment of the horse with abdominal pain. Understanding the diagnosis and treatment of orthopedic emergencies. Management of horses at the Intensive Care Unit.—I, II, III, IV. (I, II, III, IV.) Nieto

458. Equine Emergency Nights (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Provide service for emergency surgical and medical management for all equine and camelid emergencies; i.e., colic, wounds, musculoskeletal injuries, septic foals, dystocia, and neurologic and ophthalmologic emergencies.—I, II, III, IV. (I, II, III, IV.) Dechant

459. Equine Field Service (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. On-farm practical experience in the diagnosis, treatment and prevention of equine disease problems.—I, II, III, IV. (I, II, III, IV.) Spier

460. Equine Medicine—General (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Learn and practice the highest level of equine internal medicine with the goal to generate or implement a problem-oriented approach to clinical problems, determine a diagnostic work-up, prognosis and treatment plan for patients.—I, II, III, IV. (I, II, III, IV.) Pusterla

461. Equine Reproduction (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Routine reproductive management of the horse on local brood mare farms as part of a field service program and of stallion and mare infertility in a tertiary referral setting at the VMTH. Participate in weekly clinical and endocrinology rounds.—I, II, III, IV. (I, II, III, IV.) Ball

462. Equine Surgery and Lameness I (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in equine surgery services to manage all orthopedic and non-orthopedic elective surgical disorders as well as equine lameness disorders.—I, II, III, IV. (I, II, III, IV.) Galuppo

463. Farrier Shop (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Introduction to the normal structure and function of the equine foot. Principles of corrective shoeing for many lameness disorders.—I, II, III, IV. (I, II, III, IV.) Galuppo, MacDonald

464. Small Animal Community Surgery—CCAH I (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. General surgery service to include instruction in physical exams, basic anesthesia, pain management and routine surgeries. Surgeries include routine spays and neuters and other minor procedures such as simple mass removals.—I, II, III, IV. (I, II, III, IV.) Montgomery

465. Equine Surgery and Lameness II (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in equine surgery services to manage all orthopedic and non-orthopedic elective surgical disorders as well as equine lameness disorders.—I, II, III, IV. (I, II, III, IV.) Galuppo

466. Small Animal Medicine B (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Improve clinical skills required to manage cases in the Small Animal Service including comprehensive histories, preforming complete physical examinations, obtaining samples, interpreting results, conducting special procedures and assisting faculty and residents in the diagnosis, prevention, management and treatment of disease.—I, II, III, IV. (I, II, III, IV.) Johnson

469. California Animal Health and Food Safety Laboratory (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Overview of how CAHFS interfaces with the production animal industry and practitioners. Understanding of the laboratory approach to the diagnosis of predominately production animal diseases.—I, II, III, IV. (I, II, III, IV.) Kinde

470. Food Animal Preceptorship (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Individual animal medicine and surgery as well as herd reproductive programs on the farm. A regular client base with a variety of species is served: dairy cattle, beef cattle, goats and sheep.—I, II, III, IV. (I, II, III, IV.) Lane

471. Food Animal Medicine (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Hands on clinical experience diagnosing, treating, and managing medical and surgical diseases of primary care and referral cases involving dairy cattle, beef cattle, sheep, dairy goats, meat goats, and pigs.—I, II, III, IV. (I, II, III, IV.) Angelos

472. Food Animal Reproduction/Herd Health (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Provide exposure to individual animal medicine and surgery as well as herd reproductive programs on the farm. A regular client base with a variety of species is served: dairy cattle, beef cattle, goats and sheep.—I, II, III, IV. (I, II, III, IV.) Lane

473. Dairy Production Medicine—Tulare (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in a clinical dairy health and production medicine delivery system. Exposure to contemporary dairy production and population medicine programs. Develop ability to communicate with producers and farm employees.—I, II, III, IV. (I, II, III, IV.) Cullor

474. Equine Medicine Intensive Care Unit (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Emergency and critical care for equine and camelid patients including critically ill neonates, acute respiratory distress, acute diarrhea, acute neurologic disease, pleuropneumonia among others.—I, II, III, IV. (I, II, III, IV.) Magdesian

475. Lab Animal Medicine (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Provide exposure to various management activities and techniques used by laboratory animal veterinarians both antemortem & postmortem to support animal research primarily involving rodents but may include many vertebrates from fish to non-human primates.—I, II, III, IV. (I, II, III, IV.) Hewett

476. Large Animal Anesthesia (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in anesthetic management, acute care problem-solving and decision-making of healthy and physiologically stressed large animal patients.—I, II, III, IV. (I, II, III, IV.) Brosnan

477. Large Animal Radiology (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Training in the art of making quality radiographs of large animal patients and interpreting radiographic studies.—I, II, III, IV. (I, II, III, IV.) Puchalski

478. Large Animal Ultrasonography (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Hands-on experience in the ultrasonographic diagnosis of primarily musculoskeletal injuries and abdominal disorders in horses and the occasional non-equine patient.—I, II, III, IV. (I, II, III, IV.) Whitcomb

479. Small Animal Emergency—Nights (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Emergency practice includes the immediate recognition, evaluation, and care of patients with acute illness and injury.—I, II, III, IV. (I, II, III, IV.) Aldrich

480. Neurology/Neurosurgery (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Provide specialized veterinary care for animals with neurological diseases; i.e., disorders of the brain, inner ear, spinal cord, and vertebrae and diseases affecting muscles, nerves and the neuromuscular junction.—I, II, III, IV. (I, II, III, IV.) Dickinson

481. Nutrition (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in the principles and practice of small animal clinical nutrition.—I, II, III, IV. (I, II, III, IV.) Fascetti

482. Oncology (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Advanced training and experience in diagnosis, staging, medical management, and prognostication of cancer in animal patients.—I, II, III, IV. (I, II, III, IV.) Skorupski

483. Ophthalmology (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Ongoing education, training, and experience in an ophthalmic specialty practice dealing with companion and exotic species. Learn to take histories related to ocular problems, to competently examine an eye, and to perform basic diagnostic procedures.—I, II, III, IV. (I, II, III, IV.) Hollingsworth

484. Small Animal Orthopedic Surgery (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Lameness examinations and treatments for all orthopedic diseases to include osteoarthritis, developmental diseases, trauma-induced injuries and cancer. Both medical and surgical treatments are used and presented to owners in an evidenced based fashion.—I, II, III, IV. (I, II, III, IV.) Kapatkin

485. Anatomic Pathology (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Advanced training and experience to develop a general understanding of the nature of common pathologic lesions and their interpretation in light of clinical history. Postmortem techniques and practice in writing descriptions of gross lesions.—I, II, III, IV. (I, II, III, IV.) Munson

485. Primate Medicine (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Acquire skills to perform physical examinations, blood collection, cystocentesis, catheter placement, fluid therapy, basic wound care, bandaging, suturing, amputations, and orogastric tube feedings.—I, II, III, IV. (I, II, III, IV.) Christe

487. Radiation Oncology (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Staging and treatment of patients with cancer and use of radiation therapy in the treatment of cancer in companion animals. Management of clinical patients, the indications for radiation therapy and technical aspects treatment planning and dose calculations.—I, II, III, IV. (I, II, III, IV.) Theon

488. Shelter Medicine (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Exposure to all areas in a variety of shelters in the Sacramento and Bay Area. Accompany Shelter Medicine Program personnel on consultations; depending on schedule.—I, II, III, IV. (I, II, III, IV.) Hurley

489. Physical Rehabilitation (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Participate in physical rehabilitation evaluation to diagnose movement dysfunction, design and effectively implement an evidence-based treatment plan to restore, maintain or enhance optimal physical function after injury, surgery or disability. Emphasis on development of observation and manual assessment skills.—I, II, III, IV. (I, II, III, IV.) Woelz

490. Small Animal Anesthesia (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Experience in anesthetizing small animals in a clinical setting.—I, II, III, IV. (I, II, III, IV.) Pypendop

491. Small Animal Emergency—Days (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Emergency practice includes the immediate recognition, evaluation, and care of patients with acute illness and injury.—I, II, III, IV. (I, II, III, IV.) Aldrich

492. Small Animal Intensive Care Unit (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Gain and demonstrate competence in both the immediate and ongoing care of a diverse group of critically ill small animal patients. Gain proficiency in invasive procedures, cardiopulmonary resuscitation, stabilization of the respiratory distress patient and hemodynamic stabilization.—I, II, III, IV. (I, II, III, IV.) Hopper

493. Small Animal Medicine A (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Improve clinical skills required to manage cases in the Small Animal Service including comprehensive histories, preforming complete physical examinations, obtaining samples, interpreting results, conducting special procedures and assisting faculty and residents in the diagnosis, prevention, management and treatment of disease.—I, II, III, IV. (I, II, III, IV.) Johnson

494. Small Animal Radiology (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Participate in technical aspects of producing radiographs, interpreting radiographic and other diagnostic imaging studies and performing diagnostic ultrasound exams.—I, II, III, IV. (I, II, III, IV.) Wisner

495. Small Animal Soft Tissue Surgery (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Participate in management of cases referred for advanced surgical techniques to include all aspects of case management from hospital admission to discharge including daily case rounds.—I, II, III, IV. (I, II, III, IV.) Hunt

496. Behavior (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Understand the importance of behavior in companion animal practice, primarily that of dogs and cats. Apply the knowledge to prevent and treat problematic behaviors in companion animals.—I, II, III, IV. (I, II, III, IV.) Bain

497. Research (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Research rotations are designed for combined degree students who require a period of time (up to 12 weeks) to complete a discrete portion of their thesis work.—I, II, III, IV. (I, II, III, IV.) Tablin

498. Fish Health (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Focus on the application of basic fish health principles to address current problems as experienced by fish as held for research, as large populations in state fish hatcheries and as part of the collection of large public/private aquaria.—I, II, III, IV. (I, II, III, IV.) Hedrick

499. Zoological Medicine (1.5-18)
Prerequisite: fourth-year standing in the School of Veterinary Medicine. Experience in order to become proficient in performing physical examinations and collecting diagnostic samples form a variety of non-domestic animals. Majority of the rotations spent providing patient care at the Sacramento Zoo.—I, II, III, IV. (I, II, III, IV.) Wack

Departmental Courses

Anatomy, Physiology and Cell Biology (APC)

Lower Division Courses

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing; consent of instructor. Internship experience off and on campus in all subject areas offered in the Department of Anatomy, Physiology & Cell Biology. Internships are supervised by a member of the faculty. (P/NP grading only.)

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

100. Comparative Vertebrate Organology (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Science 1A and 1B or 2A and 2B. Functional anatomy of major organ systems in vertebrates. Each system examined from cellular to gross level in fish, birds, and mammals. Emphasis on how differentiated cell types are integrated into tissues and organs to perform diverse physiological functions. (Same course as Neurobiology, Physiology, and Behavior 123.)—II. (II.) Meyers

192. Internship (1-15)
Internship—3-45 hours. Prerequisite: upper division standing, approval of internship. Internship experience off and on campus in all subject areas offered in the Department of Anatomy, Physiology and Cell Biology. Internships are supervised by a member of the faculty. May be repeated for credit if topic differs. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Graduate Courses

285. Morphometry of Cells, Tissues and Organs (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100 or the equivalent; Statistics 13. Stereological estimation of volumes, surfaces and lengths of organs/components; estimation of number of cells in an organ or tissue, their volumes, products and gene expression. Practical application of stereology and avoidance of most common biases of histological measurements. Offered in alternate years.—II. Hyde

286. Basics of Microscopy and Cellular Imaging (2)
Lecture—1 hour; laboratory—2 hours. Prerequisite: graduate standing. Practical applications of basic microscope techniques used to image cells and tissues with the goal of using these techniques to generate publication quality images. Principles of light, epifluorescent, confocal and electron microscopy, their applications and limitations. Restricted enrollment. Offered in alternate years.—III. Van Winkle

290. Seminar (1)
Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (P/NP grading only.)—I, II, III. (I, II, III.)

291. Topics in Biology of Respiratory System (1)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Topics concerning structure and function of respiratory system. Possible topics include: lung growth, pulmonary reaction to toxicants, pulmonary inflammation, lung metabolism, biology of lung cells, tracheobronchial epithelium, nasal cavity structure and function. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Hyde, Wu, Pinkerton

298. Group Study (1-5)
Laboratory—6-15 hours. Prerequisite: consent of instructor.

299. Research (1-12)
Laboratory—6-36 hours. Prerequisite: consent of instructor. (S/U grading only.)

Professional Course

410. Equine Locomotor Anatomy (1.8)
Lecture—9 sessions; laboratory—9 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Normal anatomy of the equine fore and hind limb bones, joints, muscles, ligaments, tendons, nerves and vessels with emphasis on clinically applicable structures.—III. (III.) Stover

Medicine and Epidemiology (VME)

Upper Division Courses

158. Infectious Disease in Ecology and Conservation (3)
Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or Veterinary Medicine 409 or equivalent. Introduction to the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Basic epidemiological models and application to field data. Scientists' role in developing disease control policies. Offered in alternate years.—(II.) Foley

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

201. Emerging Issues in Ecosystem Health (2)
Lecture—1 hour; discussion—2 hours. Prerequisite: Active student status in the M.P.V.M., M.P.H. programs or graduate groups in epidemiology/ecology/public health/comparative pathology or consent of instructor. Principles and approaches for assessing ecosystem health with an emphasis on relationships between environmental, animal and human health and critical data gaps needed for solution-based management of ecosystems. Limited enrollment.—I. (I.) Johnson

217. Evaluation and Application of Diagnostic Tests (2)
Lecture/discussion—17 sessions; laboratory—3 sessions. Prerequisite: introductory courses in probability (e.g., Preventive Veterinary Medicine 402 or Statistics 102) and epidemiology (e.g., Preventive Veterinary Medicine 405 or Epidemiology 205); a working knowledge of immunological principles beneficial but not essential to understanding technical material associated with diagnostic tests. Topics include sensitivity, specificity, predictive values, Bayes' Theorem, ROC analysis, measuring agreement between tests, series and parallel testing strategies. Emphasis on rational evaluation, interpretation and presentation of test results for individuals and aggregates. Offered in alternate years.—III. Gardner

219. Clinical Experimental Design (3)
Lecture—15 sessions. Prerequisite: biostatistics, ecology, epidemiology, experience in clinical medicine or microbiology recommended. Design and construction of experiments, hypothesis testing, exploratory data analysis, controls, inferring causation, and the performance of scientific research. Offered in alternate years.—II. Foley

258. Infectious Disease in Ecology and Conservation (1)
Discussion—2 hours. Prerequisite: course 158 (must be taken concurrently). Presentation, analysis and discussion of primary literature on the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Multidisciplinary approach combines perspectives of ecology and veterinary medicine. Offered in alternate years. (S/U grading only.)—II. Foley

290C. Research Group Conference (1)
Conference—10 sessions. Prerequisite: first-, second- or third-year standing in the School of Veterinary Medicine. Current research topics relevant to veterinary clinical pharmacology. May be repeated two times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Tell

298. Group Study (1-5)
Prerequisite: student in School of Veterinary Medicine or consent of instructor. Group study in selected areas of the clinical sciences. (S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Courses

401. Introduction to One Health (1)
Lecture—10 sessions. Prerequisite: second- and third-year standing in the School of Veterinary Medicine. Introduce an integrated approach to understanding one health with emphasis on relationships and interdependence of environmental, animal and human health. (S/U grading only.)—II. (II.) Johnson

410. Husbandry, Feeding and Management of Captive Animals (2)
Lecture—20 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine. Introduction of management and husbandry dynamics as a prerequisite for preventive health programs in zoos, aquaria, vivaria, and other environments for exotic pets and wild animals.—III. (III.) Wack

413. Medical Primatology (2)
Lecture—20 sessions. Prerequisite: second- and third-year standing in School of Veterinary Medicine. Major diseases, medical management and husbandry of captive non-human primates. (S/U grading only.)—III. (III) Lerche

415. Management and Diseases of Captive Wildlife (2)
Lecture—20 sessions. Prerequisite: second- or third-year standing in the School of Veterinary Medicine. Introduction to the roles of a zoological veterinarian and the most common topics encountered. Emphasis on taxonomy, husbandry, preventive medicine and the most common diseases seen in common captive wildlife species.—I. (I.) Wack

416. Diseases of Fish (2.1)
Lecture—18 sessions; laboratory—3 sessions. Prerequisite: second- or third-year standing in the School of Veterinary Medicine. Etiology, pathology, diagnosis, treatment and prevention of diseases of fish. Preventive management of diseases in aquaculture and aquaria. Offered in alternate years.—III. Hedrick

417. Companion Avian Medicine (2)
Lecture—20 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Diseases, diagnostics, medical management and surgery of psittacine species. Avian nutrition, husbandry, and management.—II (II.) Paul-Murphy

419. Companion Exotic Small Animal Medicine and Surgery (3.4)
Lecture—34 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. The etiology, clinical presentation, diagnostic evaluation, treatment, prevention, and control of medical diseases of companion small exotic mammals, amphibians and reptiles.—I. (I.) Hawkins

424. Shelter Medicine (1)
Seminar—10 sessions. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine. Shelter medicine is a newly emerging specialty in veterinary medicine building on the clever solutions and experience of hundreds of shelter veterinarian, managers, technicians, rescue and foster homes, and others, who have learned their skill in the trenches. (S/U grading only.)—III. (III.) Hurley

427. Introduction to Food Animal Herd Health Medicine (1.9)
Lecture—17 sessions; laboratory—2 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, course 463A and 463B (concurrently) or consent of instructor. Introduction to current problem solving concepts, approaches, and issues addressed in subsequent food animal medicine courses; contexts for developing problem solving skills through on-site, field investigation of herd and flock health problems.—I. (I.) Hoar

428. Food Animal Surgery (1.6)
Lecture—16 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Selected topics in surgical diseases of food animals.—III. (III.) Chigerwe

428L. Food Animal Surgery Laboratory (0.8)
Laboratory—8 sessions. Prerequisite: third-year standing in School of Veterinary Medicine; course 428 (concurrently). Representative surgeries of food animals performed by groups of students. Limited enrollment. (S/U grading only.)—III. (III.) Chigerwe

429A. Sheep Herd Health (1)
Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, course 463A, 463B, 427, course 463C concurrently, or consent of instructor. The application of problem-solving and epidemiologic methods to sheep diseases and their control.—II. (II.) Lane

429B. Beef Herd Health (1)
Lecture—10 sessions. Prerequisites: third-year standing in the School of Veterinary Medicine, course 463A, 463B, 427, 463C concurrently or consent of instructor. The application of problem-solving methods to diseases of grazing beef cattle and their control.—II. (II.) Hoar

429C. Swine Herd Health (1)
Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, course 463A, 463B, 427, course 463C concurrently, or consent of instructor. The application of problem-solving and epidemiologic methods to swine diseases and their control.—II. (II.) Gardner

432. Medical and Husbandry Procedures for Raptors (1)
Laboratory—10 sessions. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine or consent of instructor. Limited to 15 students. Serves as student treatment crew for the Raptor Center providing hands-on experience with handling, restraint and treatment for ill and injured birds of prey with the goal of rehabilitation and release back into their native habitat. May be repeated one time for credit with consent of instructor.—I, II, III. (I, II, III.) Hawkins

433R. Cardiology Journal Club (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Restricted to current cardiology resident or resident in other services. Critical evaluation of scientific articles relevant to cardiology; including evaluation of hypothesis/objectives, study design, experimental and statistical methods, results, conclusions, references and new applications. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Griffiths

434R. Large Animal Resident Seminar (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Restricted to current large animal resident or resident in other services. Review organ-system based large animal internal medicine topics to prepare large animal residents for boards. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Pusterla

435R. Companion Animal and Exotic Pet Journal Club (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Restricted to current CAPE, zoological medicine, marine mammal intern resident or resident in other services. Current evaluation of scientific articles in zoological companion animals, including evaluation of the hypothesis/objectives, study design, methods (experimental, statistical), results, conclusions, references, and new applications. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Hawkins

437R. Aquatic Animal Health Journal Club (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Restricted to current aquatic, zoological, or companion avian and exotic pet resident or resident in other services. Review current trends in aquatic animal health from both the veterinary and scientific literature. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Weber

438R. Small Animal Medicine Physiology & Pathophysiology Review (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Restricted to current small animal resident or resident in other services. Review organ-system-based physiology and pathophysiology to prepare residents for board examinations. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Marks

439R. Dermatology Journal Club & Seminars in Veterinary & Comparative Dermatology (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Restricted to dermatology or pathology residents or instructors, veterinarians either board eligible or board certified in dermatology or pathology. Critical evaluation of refereed journal articles, textbooks, and proceedings within the disciplines of dermatology, pathology, or immunology. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Ihrke

440R. Dermatopathology Conference & Seminar (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Restricted to current dermatopathology resident or resident in other services. Presentation of interesting "unknown" cases by dermatopathologists for residents to describe lesions. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Ihrke

441R. Zoological Medicine Journal Club (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Restricted to current zoological medicine resident or resident in other services. Provide coverage of broad range of topics in zoological medicine, captive wildlife, free-ranging wildlife, terrestrial mammals, marine mammals, birds, reptiles, amphibians, and fish to assist residents in preparation for board examination and improve knowledge and proficiency in zoological practice. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Larsen

442R. Laboratory Animal Medicine Resident Seminar (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Restricted to current laboratory animal resident or resident in other services. Laws and regulations, biology, animal models, journal review, different diagnostic techniques, anesthesia, pathology. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Christe

443R. Small Animal Internal Medicine Journal Club (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Review of current internal medicine literature to include topics in endocrinology, renal medicine, gastrointestinal disorders, cardiorespiratory medicine, and infectious disease. Focus on critical review of scientific design and methodology, interpretation of results, and relevance to clinical practice. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Johnson

446. Small Animal Reproduction (1)
Lecture—7 sessions; discussion—1 session; laboratory—2 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Provides a complete description (history, physical examination, laboratory abnormalities, etc.) of the common abnormalities associated with the genital tract of male and female dogs and cats.—III. (III.) Feldman

450. Small Animal Clinical Immunology (1.7)
Lecture—17 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Review of the basic mechanisms of immunologic diseases in small companion animals and a description of common immunologic diseases organized by body system, including clinical presentation, diagnosis and treatment.—III. (III.) Sykes

458. Behavior Therapy in Companion Animals (2)
Lecture—20 sessions. Prerequisite: second- and third-year standing in the School of Veterinary Medicine. Clinical application of behavior modification procedures, management and drug therapy to resolve common behavioral problems of companion animals including dogs, cats, horses and birds.—III. (III.) Bain

461A. Small Animal Medicine—Level I (3.6)
Lecture—32 sessions; lab—4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Fundamental principles, clinical manifestations, diagnostic methods and therapeutic approaches to the medical diseases of dogs and cats. Course is a core option for the professional veterinary curriculum and preparatory for advanced courses in small medical diagnoses and therapeutics.—III. (III.) Johnson

461B. Small Animal Medicine—Level I (3.3)
Lecture—33 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and completion of course 461A, if Small Animal Medicine is your core or consent of instructor. Continuation of fundamental principles, clinical manifestations, diagnostic methods, and therapeutic approaches to the medical diseases of dogs and cats.—I. (I.) Marks

461C. Small Animal Medicine—Level I (3.7)
Lecture—37 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, course 461A, 461B (Small Animal Medicine core only), or

consent of instructor. Continuation of fundamental principles, clinical manifestations, diagnostic methods and therapeutic approaches to the medical diseases of dogs and cats.—II. (II.) White

462. Small Animal Medicine, Level II (2)
Discussion—20 sessions. Prerequisite: course 461A, 461B, 461C, third-year standing in the School of Veterinary Medicine or consent of instructor. Emphasis on differential diagnosis covering diseases of the skin, cardiovascular, respiratory, gastrointestinal and urinary systems, plus infectious diseases affecting various organ systems. The course is a bridge between didactic teaching and the use of that knowledge in a clinical setting.—III. (III.) Ihrke

463A. Food Animal Medicine, Level I (3.6)
Lecture—36 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Fundamentals of food animal medicine presented in a lecture format with integrated case discussion to illustrate the context and application of material presented and to promote development of problem-solving skills.—III. (III.) Angelos

463B. Food Animal Medicine, Level I (3.4)
Lecture—34 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and completion of course 463A, if Food Animal Medicine is your core. Fundamentals of food animal medicine with integrated case discussions to illustrate the context and application of material presented and to promote development of problem-solving skills.—I. (I.) Angelos

463C. Food Animal Medicine, Level I (3.1)
Lecture—26 sessions; discussion—5 sessions; project. Prerequisite: third-year standing in the School of Veterinary Medicine; completion of course 463A and 463B if Food Animal Medicine is fulfilling your core requirement. Continuation of the fundamentals of food animal medicine with integrated case discussions to illustrate the context and application of material presented and to promote development of problem-solving skills.—II. (II.) Angelos

464A. Equine Medicine, Level I (3.2)
Lecture—28 sessions; laboratory—4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. The etiology, pathophysiology, epidemiology, clinical presentation, diagnostic evaluation, treatment, presentation, and control of important infectious and non-infectious diseases of horses. Emphasis on problem-based approach to differential diagnosis.—III. (III.) W.D. Wilson

464B. Equine Medicine, Level I (3.7)
Lecture—35 sessions; discussion—2 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine and completion of course 464A (Equine Medicine core). Continuation in instruction in the etiology, pathophysiology, epidemiology, clinical presentation, diagnostic evaluation, treatment, prevention, and control of important infectious and noninfectious diseases of horses. A problem-based approach to differential diagnosis is emphasized.—I. (I.) Spier

464C. Equine Medicine, Level I (3.4)
Lecture—33 sessions; discussion—1 session. Prerequisite: third-year standing in the School of Veterinary Medicine (and completion of courses 464A and 464B if Equine Medicine is fulfilling your core requirement); consent of instructor. Continuation in instruction in the etiology, pathophysiology, epidemiology, clinical presentation, diagnostic evaluation, treatment, prevention and control of important infectious and non-infectious diseases of horses. A problem-based approach to differential diagnosis emphasized.—II. (II.) Pusterla

465. Advanced Equine Medicine, Level II (3.6)
Lecture—36 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; courses 464A, 464B, and 464C. An approach to commonly encountered problems of horses held as individuals and farm settings. Development of problem-solving skills related to the medical management of horses and their problems.—III. (III.) Watson

465L. Advanced Equine Medicine Level II Laboratory (0.8)
Laboratory—8 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; courses 464A, B, C; concurrent enrollment in course 465. Clinical presentation and instruction in treatment of the medical aspects of equine practice. (S/U grading only.)—III. (III.) Watson

466. Equine Critical Care (2)
Lecture—10 sessions; discussion—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, course 464A, 464B, 464C, or consent of instructor. Focus on common equine emergencies and their initial life-support management strategies. Rational approach to diagnosis and management of emergency and critically ill equine patients in clinical practice. Pathophysiology of Systemic Inflammatory Response Syndrome (SIRS), Multiple Organ Dysfunction Syndrome (MODS), and critical illness.—III. (III.) Magdesian

468. Advanced Feline Medicine (2)
Lecture—20 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Fundamental principles, clinical manifestations, diagnostic methods, and therapeutic approaches to medical diseases of cats. Diseases unique to cats and diseases whose clinical presentations and diagnostic evaluations are fundamentally different in cats versus dogs.—III. (III.) Westropp

481. Clinical Rounds (1)
Discussion—10 sessions. Prerequisite: first- or second-year standing in the School of Veterinary Medicine or consent of instructor. Discussion of selected small and large animal cases from the Veterinary Medical Teaching Hospital. May be repeated one time for credit. (S/U grading only.)—I, II. (I, II.) W.D. Hopper

486. Equine Clinical Neonatology (1)
Discussion—10 sessions. Prerequisite: first-, second- and third-year standing in the School of Veterinary Medicine. Discussion of methods of equine neonatal intensive care and disease pathophysiology in a case format. May be repeated one time for credit. (S/U grading only.)—III. (III.) Madigan, Magdesian

487. Comparative Anatomy and Physiology of Non-Domestic Animals (2)
Lecture—20 sessions. Prerequisite: first-, second- or third-year standing in the School of Veterinary Medicine. Comparative anatomy and physiology of non-domestic species, including captive and free-ranging wildlife, exotic pets, laboratory animals, and species in apiculture, aquaculture, and viculture. Basis for understanding husbandry, diseases, and other veterinary concerns of multiple taxa. (S/U grading only.)—II. (II.) Larsen

494. International Programs Seminar (1)
Seminar—10 sessions. Prerequisite: first-, second-, or third-year standing or MPVM standing in the School of Veterinary Medicine. Discussion by veterinarians around the world of aspects of veterinary medicine in their countries and regions, ranging from livestock to wildlife medicine to companion animal practice. May be repeated two times for credit. (S/U grading only.)—II. (II.) Tell

Molecular Biosciences (VMB)

Lower Division Course

92. Internship (1-12)
Internship—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the Department of Molecular Biosciences. Internships supervised by a member of the faculty. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

253. Metabolism of Toxicants and Drugs (2)
Lecture—2 hours. Prerequisite: Pharmacology and Toxicology 201, 202, 203, general biochemistry or consent of instructor. Significance/chemical pathways of toxicants and drug metabolism, enzymology and molecular aspects of P450 and flavin monooxygenases, hydrolases and phase 2 transferases and experimental approaches for metabolism studies. Offered in alternate years.—II. Buckpitt

254. Toxicology of the Respiratory System (3)
Lecture—3 hours; discussion. Prerequisite: Pharmacology and Toxicology 201, 202, 203, or consent of instructor. Survey of structure and function of the respiratory system, the pathophysiology of major lung diseases, the interactions of toxicants with the lung and response of this organ to injury. Offered in alternate years.—(II.) Pinkerton

290. Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing and consent of instructor Topics in nutrition, pharmacology/toxicology, and biochemistry. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

297T. Tutoring in Graduate Molecular Biosciences (1-5)
Prerequisite: graduate or professional student standing and consent of instructor. Assist in preparation and teaching of courses in Nutrition, Pharmacology and Toxicology, or other courses offered by the department under direct supervision of the instructor. Designed for graduate or professional students who desire teaching experience in graduate courses. May be repeated up to 5 units of credit. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Course

397T. Tutoring in Molecular Biosciences (1-5)
Discussion—1-5 hours. Prerequisite: graduate or professional standing and consent of instructor. Experience in professional curriculum for graduate or professional students, not teaching assistants, under direct supervision of instructor. May be repeated up to 5 units of credit (S/U grading only.)—I, II, III. (I, II, III.).

Professional Courses

475. Case Studies in Large Animal Clinical Toxicology (1.5)
Discussion—15 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Clinical systematic approach to poisoning problems in horses, cattle, sheep, goats, lamoids and other livestock emphasizing their diagnosis and treatment.—I. (I.) Puschner

480. Case Studies in Small and Exotic Animal Clinical Toxicology (1.5)
Discussion—15 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Clinical systematic approach to poisoning problems in small and exotic animals emphasizing diagnosis and treatment.—II. (II.) Jandrey, Poppenga

485. Advanced Clinical Nutrition (2)
Lecture—14 sessions; laboratory—1 session; discussion—4 sessions; project. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Advanced training in the principles and application of small animal clinical nutrition. (S/U grading only.)—I. (I.) Fascetti

Pathology, Microbiology, and Immunology (PMI)

Lower Division Course

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

Upper Division Courses

126. Fundamentals of Immunology (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102 or the equivalent or consent of instructor. Overview of immunology including components of the immune system, initiation and regulation of the immune response, infection and immunity, hypersensitivity and immune dysfunction. Clinical immunologic techniques, immunodeficiency and vaccinology.—II. (II.) Stott

126L. Immunology Laboratory (2)
Laboratory—6 hours. Prerequisite: course 126 or the equivalent (may be taken concurrently). Laboratory procedures in clinical immunology. Laboratory animal immunization/bleeding. Quantitative and qualitative characterization of the immune response. Cells of the immune system.—II. (II.) Stott

127. Medical Bacteria and Fungi (5)
Lecture—3 hours; laboratory—5 hours. Prerequisite: general microbiology (Microbiology 102 and 102L), basic immunology (course 126 or Medical Microbiology 188). An introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease.—III. (III.) LeFebvre

128. Biology of Animal Viruses (3)
Lecture—3 hours. Prerequisite: Biological Sciences 102. Fundamental physical and chemical properties of animal viruses; methods of propagation, purification and assay. Mechanisms of viral replication and pathogenesis of viral infections in man and animals. Immunity to virus diseases and oncogenic properties of animal viruses. Two units of credit to students who have completed Microbiology 162.—I. (I.) Miller

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

250. Philosophy and Ethics of Biomedical Science (1)
Seminar—1 hour. Prerequisite: graduate-level standing. Presentations by faculty and guest speakers followed by discussions of relevant current events by graduate students. (S/U grading only.)—III. (III.) Galland

270. Advanced Immunology (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: Introductory course in immunology. Graduate student status in the Comparative Pathology Graduate Group. All other students will require consent of instructor. Current concepts of immunology with an emphasis on interactions between the host, the environment and the pathogen. These interactions will include those that are protective and successful for the host as well as those that are deleterious—II. (II.) Stott

275. Comparative Pathology of Organ Systems (4)
Lecture—3 hours; laboratory/discussion—2 hours. Prerequisite: graduate level standing. Correlative alterations in structure and function of organ response to injury presented in context of major disease syndromes. Emphasis on general responses to disease in both humans and animals. Introductory material on the mechanisms of viral, bacterial and parasite pathogenesis.—I. (I.) Affolter

283. Comparative Avian Anatomy and Pathology (1-3)
Lecture—3 hours. Prerequisite: Anatomy section (1 unit): upper division undergraduate standing, veterinary students, or graduate standing, and consent of instructor; Pathology section: third- or fourth-year standing in the School of Veterinary Medicine or graduate standing and consent of instructor. Ten lectures outline gross/microscopic functional anatomy of a wide range of avian species as appropriate for students interested in avian biology. The remaining 20 lectures encompass comparative aspects of avian pathobiology and disease manifestations for students interested in avian diseases.—I. (I.) Lowenstine

285. Cellular Basis of Disease (3)
Lecture—3 hours. Prerequisite: Biological Sciences 104, Veterinary Medicine 452, course 275, or Medical Pathology 210. Application of cell biology, biochemistry and molecular biology to the understanding of the basic nature of disease. Cellular injury and mechanisms of adaptation, host-defense and vascular responses, and cellular transformation.—II. (II.) Mohr, Wu

287. Comparative Pathology of Laboratory Animals (3)
Lecture—3 hours. Prerequisite: general and systemic pathology; second-, third-, or fourth-year standing in the School of Veterinary Medicine or graduate student standing, or consent of instructor. Recognition of lesions and understanding of pathogenesis of diseases of animals commonly kept in laboratory settings. Species covered include rodents, lagomorphs, amphibians, nonhuman primates, genetically manipulated animals and novel animal models. Offered in alternate years.—(III.) Lowenstine

290. Seminar (1)
Seminar—1 hour. Prerequisite: graduate level standing. Topics in pathology, microbiology or immunology. May be repeated for credit. (S/U grading only.) I, II, III, IV. (I, II, III, IV.)

291A. Seminar in Immunology (1)
Seminar—1 hour. Prerequisite: course 126 or the equivalent. Students choose topic for each quarter. Individual or pairs of students choose a paper for all to read and present a seminar based on the subject of the paper. All students participate in discussion. May be repeated for credit. (S/U grading only.)—I, III. (I, III.) Gershwin

292B. Surgical Pathology Conference (1)
Discussion—1 hour. Prerequisite: graduate student standing or consent of instructor. Diagnosis and discussion of current surgical pathology cases based on clinical records and microscopic study. May be repeated for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Munson

293A. Seminar in Infectious Diseases (1)
Seminar—1 hour. Prerequisite: current enrollment in health science professional school or graduate standing in biological sciences. Discussion of current topics and cases of infectious diseases. May be repeated one time for credit if topic differs. (S/U grading only.)—I, II, III. (I, II, III.) Byrne

293B. Necropsy and Surgical Pathology (2-4)
Laboratory—6-12 hours. Prerequisite: graduate student standing and consent of instructor. Responsible diagnostic casework. Performance of necropsies, slide reading, and case reporting. May be repeated for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Munson

296. Microbiological Diagnosis (2-5)
Laboratory—5-14 hours; discussion—1 hour. Prerequisite: laboratory course in veterinary or medical microbiology or equivalent or consent of Chief of Microbiology, VM Teaching Hospital. Laboratory diagnosis of infectious diseases involving case work at the VM Teaching Hospital. (S/U grading only.) I, II, III. (I, II, III.) Byrne

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

Professional Courses

418. Health and Disease in Terrestrial Wildlife (2)
Lecture—20 sessions. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine or consent of instructor. Ecology and epidemiology of disease in free-ranging terrestrial wildlife. Offered in alternate years. (S/U grading only.)—II. Ziccardi

419. Field Techniques for Assessment of Wildlife and Ecosystem Health (2)
Fieldwork—7 sessions. Prerequisite: first-, second-, third-year or MPVM standing in the School of Veterinary Medicine and consent of instructor. Introduction to the concepts and technical skills necessary to conduct field studies pertaining to wildlife/ecosystem health. Different opportunities will be offered in alternate years-even years offered in Southern California, odd years in either Northern California or outside the state. Limited enrollment. May be repeated two times for credit. (S/U grading only.)—III. (III.) Ziccardi

460R. Diagnostic Pathfinder (2)
Discussion—20 sessions. Prerequisite: resident status at the Veterinary Medical Teaching Hospital. Restricted to current clinical pathology resident. Work cases using the Diagnostic Pathfinder (computer-based instructional tool) as a mechanistic approach to develop diagnostic reasoning skills in the interpretation of laboratory data. Residents will work the cases independently and meet to present and discuss them in the group. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Christopher

461R. Clinical Pathology Journal Club (1)
Discussion—10 sessions. Prerequisite: resident status at the Veterinary Medical Teaching Hospital. Restricted to current clinical pathology resident. Critical evaluation of scientific articles in clinical and basic pathology, including evaluation of the hypothesis/objectives, study design, methods (experimental, statistical), results, conclusions, references, and new applications. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Christopher

462R. Clinical Pathology Resident Rounds (1)
Discussion—10 sessions. Prerequisite: resident status at the Veterinary Medical Teaching Hospital; consent of instructor. Restricted to current clinical pathology resident. Present reviews of selected topics in clinical pathology, reviews of selected laboratory procedures or best practices, and current and proposed research projects. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Christopher

463R. Cytopathology Rounds (1)
Discussion—10 sessions. Prerequisite: resident status at the Veterinary Medical Teaching Hospital; consent of instructor. Restricted to current clinical pathology resident or resident in other services. Describe and interpret cytologic, hematologic, and correlative histologic specimens via presentation of glass slides on the multi-headed microscope, and lead a critical discussion of the findings. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Borjesson

480R. Gross Pathology Discussion (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Review of gross pathology including formulation of morphological diagnosis, etiologic diagnosis, differential diagnoses, causes and/or pathogenesis. Gross pathology presented by organ system or species with an emphasis on species underrepresented in resident cases. May be repeated 15 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Munson

481R. Zoological Pathology Rounds (0.5)
Discussion—5 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Review of disease processes and their pathogenesis in zoo and wild animals including companion avian and exotic pets and fish. Current cases from CAPE, Zoo Med, Fish Health and Pathology services will be the basis for discussions. May be repeated 20 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Lowenstine

482R. Pathology Research Seminar (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Overview of a variety of research programs to focus on transitioning from diagnostic pathology into investigative pathology. May be repeated 10 times for credit. (S/U grading only.)—III. (III.) Munson

483R. Advanced Systems and Species Pathology (1)
Lecture/discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Overview of the pathological basis of diseases of selected organ systems or species and the gross and histopathologic appearance of these diseases. May be repeated 15 times for credit. (S/U grading only.)—I, II. (I, II.) Munson

484R. Advanced General Pathology Review (0.5)
Discussion—5 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Review of general pathologic mechanisms of diseases using current veterinary and human textbooks and pathology-related journals. May be repeated 12 times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Mohr

485R. Journal Club/Histopathology Conference (1)
Lecture/discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Review of current veterinary pathology or general pathology literature supported by histopathology from case material. May be repeated 15 times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Pesavento

486R. Dermatopathology Conference (1)
Seminar—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Diagnosis and discussion of current dermatopathology cases (both surgical and necropsy samples) based on clinical records and microscopic study. May be repeated 15 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Affolter

Population Health and Reproduction (PHR)

Lower Division Course

92. Internship in Veterinary Science (1-4)
Discussion/laboratory—1-4 hours; clinic—3-36 hours; final report. Prerequisite: approval of project prior to period of internship by faculty sponsor. Supervised work experience in reproduction. (P/NP grading only.)

Upper Division Courses

106. Human-Animal Interactions: Benefits and Issues (2)
Lecture—18 sessions; fieldwork—1 session. Prerequisite: upper division standing or consent of instructor. The contributions of animals to human society, including historic, anthropologic, developmental, human health and therapeutic perspectives, as well as effects of humans on animals. One field trip required.—II. (II.) Hart

192. Internship in Veterinary Science (1-12)
Discussion/laboratory—1-12 hours; clinic—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work experience in Reproduction. May be repeated for credit. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

202. Sampling in Health-Related Research (3)
Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 403 or the equivalent; consent of instructor. A very thorough coverage of simple random sampling, stratified sampling, cluster sampling, systematic sampling and other sampling methods applied extensively in epidemiology and other health-related disciplines. Emphasis on application of the sampling methods. Offered in alternate years.—II. Farver

203. Multivariate Biostatistics (3)
Lecture—3 hours. Prerequisite: Preventive Veterinary Medicine 403 and 404, or the equivalent; consent of instructor. Multivariate procedures covered are principal component analysis, factor analysis, Two-group and k-group multivariate ANOVA, multivariate regression, Two-group and k-group discriminant analysis and repeated measures analysis, cluster analysis, and canonical analysis. Emphasis is on application of procedures. Offered in alternate years.—(II.) Farver

212. Epidemiology of the Zoonoses (4)
Lecture—35 sessions; discussion—5 sessions. Prerequisite: graduate standing or third-year standing in the School of Veterinary Medicine or consent of instructor. Epidemiological, biological and ecological features of some major infections shared by humans and other animals. Wildlife and domestic animals zoonoses of major health and economic significance are presented to illustrate how knowledge of zoonoses epidemiology is essential for implementing control measures.—II. (II.) Chomel

214. Vector-Borne Infectious Diseases: Changing Patterns (2)
Lecture/discussion—2 hours. Prerequisite: Open to graduate students, MPVM and MPH students, DVM and medical students with second- or third-year standing. Open to upper division undergraduate students with consent of instructor. Vector-borne infectious diseases especially as they relate to changing patterns associated with climatic changes, trade and population movement. (Same course as Entomology 214.)—I. (I.) Chomel

232. Advanced Reproductive Biology (3)
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: neurobiology, physiology and behavior 121 and 130; graduate standing or consent of instructor. Examination of or challenge to established and emerging concepts at the molecular, cellular and organismal levels. Reproductive development, the male, the non-pregnant female and the pregnant or senescent female. Offered in alternate years.—(III.) Conley

241. Advanced Topics in Canine Genetics and Genomics (2)
Discussion—2 hours. Prerequisite: Genetics 201A, 201C (or equivalents, with consent of instructor). In-depth study of topics in canine genomics and genetics. Topics will vary annually, but can include positional cloning, whole genome association, complex traits and linkage disequilibrium. Students will lead discussions on assigned readings. May be repeated for credit when topic differs. Limited enrollment. Offered in alternate years.—III. Bannasch

242. Ecological Genetics: Applied Genetics for Ecology, Health, and Conservation of Natural Populations (3)
Lecture—2 hours; discussion—0.5 hours; laboratory—0.5 hours. Prerequisite: undergraduate genetics and ecology/conservation biology courses recommended. Introduction to the field of applied ecological genetics to include applications in conservation ecology, population genetics, population biology, wildlife health and disease ecology. Limited enrollment. (Same course as Ecology 242.)—II. (II.) Ernest

266. Applied Analytic Epidemiology (3)
Lecture—2 hours; laboratory—2 hours. Prerequisite: Preventive Veterinary Medicine 404 or consent of instructor. Principles and applications in analysis of epidemiologic data. Methods of analyzing stratified and matched data, logistic regression for cohort and case-control studies, Poisson regression, survival-time methods. (Same course as Master of Public Health 266.)—III. (III.) Kass

290A. Seminar (1)
Seminar—1 hour. Discussion of current topics in animal reproduction and medicine, as well as presentation of research findings by graduate students and faculty. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Ball

292. Current Topics in Reproduction (1)
Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current scientific literature in reproduction, as well as presentation of research findings by graduate students and faculty. (S/U grading only.)—I, II, III. (I, II, III.)

298. Group Study (1-5)
Prerequisite: consent of instructor.

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

406. Human-Animal Interactions in Veterinary Science (1)
Lecture—9 sessions; fieldwork—1 session. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine. Human relationships with companion animals, and, secondarily, on food, laboratory, and wild animals from the perspectives of veterinarians and their clients' needs.—II. (II.) Hart

408. Behavior and Biology of Mice as Domestic Animals (1)
Lecture—10 sessions. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine, or graduate standing in psychology, animal science, animal behavior, or consent of instructor. Laboratory mouse biology and welfare, including the development and purposes of specialized strains of mice, constraints for their care and environmental enrichment, legislation and regulation, and the human benefits of their use.—II. (II.) Hart

420. Zoonoses of Non-Human Primates (2)
Lecture—20 sessions. Prerequisite: second- or third-year standing in the School of Veterinary Medicine. Epidemiological, clinical, and biological features of zoonoses of non-human primates. Emphasis given to major zoonoses which are threatening to human health and their treatment and prevention. Focus also on management of non-human primates in research, zoological gardens and in the wild. Offered in alternate years.—(II.) Chomel

429D. Dairy Herd Health Management (4)
Lecture—40 sessions. Prerequisite: Medicine and Epidemiology 427, 463A, 463B, 463C, third-year standing in School of Veterinary Medicine, or consent of instructor. Practical systems for delivering veterinary services to dairy farms with emphasis on disease prevention and improved herd performance.—III. (III.) Cullor

429DL. Dairy Herd Health Management Laboratory (0.6)
Laboratory—6 sessions. Prerequisite: third-year standing in School of Veterinary Medicine; course 429D concurrently or consent of instructor. Practical systems for delivering veterinary services to dairy farms with emphasis on disease prevention and improved herd performance. Field trips and computer laboratories to practice skills in animal observations, facilities observations and use of the computer for nutrition services and dairy records analysis. (S/U grading only.)—III. (III.) Cullor

429E. Dairy Goat Herd Health (1)
Lecture—10 sessions. Prerequisite: Medicine and Epidemiology 427, 463A, 463B, 463C, third-year standing in School of Veterinary Medicine, or consent of instructor. The application of problem-solving and epidemiologic methods to dairy goat diseases and their control.—III. (III.) Rowe

432. Reproductive Technology in Mammals and Birds (0.8)
Lecture—5 sessions; discussion—3 sessions. Prerequisite: first-year standing in the School of Veterinary Medicine or consent of instructor. Introductory course in the application of technology to the reproductive process in mammals and birds. Emphasis on domestic animals, but birds and non-domestic mammals discussed to limited extent. Expose students to some of the "sexier" aspects of population/reproduction management. (S/U grading only.)—III. (III.)

432L. Reproductive Technology in Mammals and Birds, Laboratory (0.2)
Laboratory—2 sessions. Prerequisite: course 432 concurrently, first-year standing in the School of Veterinary Medicine. Laboratory demonstrations and exercises in gamete freezing, thawing, and handling; artificial insemination of cattle; artificial insemination and other applications of reproductive technology in small ruminants. (S/U grading only.)—III. (III.)

440. Ruminant Clinical Nutrition (1.9)
Lecture—19 sessions. Prerequisite: second- or third-year standing in the School of Veterinary Medicine or consent of instructor. Nutritional related disorders in ruminants with a herd basis approach. Nutritionally related disorders that affect modern cattle production. Emphasis on understanding the problem and preventing it through nutritional management.—III. (III.) Rossow

442. Equine Theriogenology (2)
Lecture—20 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Discussions of abnormal conditions and physiologic function in equine reproduction with emphasis on methods of diagnosis and interpretation of clinical and laboratory findings associated with the abnormalities.—I. (I.) Ball

442L. Equine Theriogenology Laboratory (1)
Laboratory—10 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Hands-on diagnosis, implementation of techniques related to reproductive examination of horses. Routine, current procedures performed on farms. Designed to maximize opportunity for assessment of normal reproductive anatomy, diagnosis, interpretations of physiologic conditions for becoming comfortable in performing various routine procedures. (S/U grading only.)—I. (I.) Ball

445. Food Animal Theriogenology and Reproductive Performance (2)
Lecture—20 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Physiological, pathophysiological, and management factors affecting the reproductive health and performance of food animals, with emphasis on dairy, beef cattle, and sheep. Minor emphasis on swine and goats. Assessment of, and intervention strategies for, herd reproductive performance.—II. (II.) Lane, Rowe

445L. Food Animal Theriogenology Laboratory (1)
Laboratory—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, course 445 concurrently or consent of instructor. Obstetrical and gynecological diagnosis and treatment for food animals; breeding soundness examination of males; analysis and on-farm use of computerized reproductive records; embryo technology. (S/U grading only.)—II. (II.) Lane, Rowe

446A. Food Animal Reproduction (1)
Lecture—6 sessions; laboratory—4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Conditions affecting the reproductive system in the cow, sow, ewe, and goat, with emphasis on symptomatology, pathophysiology, treatment, control, prevention, and herd health applications.—III. (III.) Rowe

446B. Equine Reproduction (0.6)
Lecture—6 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Introduction to clinical equine reproduction with emphasis on methods of diagnosis and the interpretation of clinical and laboratory findings.—III. (III.) Ball

446C. Non-Domestic Reproduction (1)
Lecture—10 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Follows course 446A. Information relating to reproduction in non-domestic mammals, birds, and reptile species. Concepts relating to the evaluation of reproductive status, diagnosis of infertility, assisted reproduction and contraception will be presented.—III. (III.) Bon-Durant

452. On-Farm Food Safety/Veterinary Public Health (2)
Lecture—20 sessions. Prerequisite: Master's of Preventive Veterinary Medicine (MPVM) students or consent of instructor. The organizations and regulations responsible for ensuring food safety, pathogens that may be on the farm and cause public health concerns, management systems that affect animal health, and key topics regarding environmental health relating to animal agriculture.—III. (III.) Chomel, Cullor

457. Veterinary Practice Management (2)
Lecture—20 sessions. Prerequisite: first-, second-, and third-year standing in the School of Veterinary Medicine or consent of instructor. Information essential to the successful management of a veterinary practice. Topics include basic accounting, medical recordkeeping, money management, business and personal insurance, client relations and tax law. (S/U grading only.)—III. (III.)

Preventive Veterinary Medicine (MPM)

Professional Courses

402. Medical Statistics I (4)
Lecture—3 hours; laboratory—2 hours. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Statistics in clinical, laboratory and population medicine: graphical and tabular presentation of data; probability; binomial; Poisson, normal, t-, F-, and Chi-square distributions; elementary nonparametric methods; simple linear regression and correlation; life tables. Microcomputer applications of statistical procedures in population medicine.—I. (I.) Farver

403. Medical Statistics II (4)
Lecture—3 hours; laboratory—2 hours. Prerequisite: MPVM standing in the School of Veterinary Medicine and/or successful completion of course 402 (or equivalent) or consent of instructor. Continuation of course 402. Analysis of variance in biomedical sciences; nonparametric methods; multiple regression; biomedical applications of statistical methods. Microcomputer applications to reinforce principles that are taught in lecture.—II. (II.) Farver

404. Medical Statistics III (4)
Lecture—3 hours; laboratory—2 hours. Prerequisite: MPVM standing in the School of Veterinary Medicine and/or successful completion of course 403 (or equivalent) or consent of instructor. Continuation of course 403. Analysis of time dependent variation and trends, analysis of multiway frequency tables; logistic regression; survival analysis selecting the best regression equation; biomedical applications.—III. (III.) Farver

405. Principles of Epidemiology (4)
Lecture—4 hours. Prerequisite: MPVM standing in the School of Veterinarian Medicine or consent of instructor. Basic epidemiologic concepts and approaches to epidemiologic research, with examples from veterinary and human medicine, including outbreak investigation, infectious disease epidemiology, properties of tests, and an introduction to epidemiologic study design and surveillance. (Same course as Epidemiology 205A.)—I. (I.) Gold, Miller

405L. Epidemiology Laboratory (1)
Laboratory—10 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. A practical application of epidemiological methods using the microcomputer as a tool to solve problems. Utilizes spreadsheets and databases as tools to organize and analyze data. Emphasize epidemiological methods introduced in course 405.—I. (I.)

406A. Epidemiologic Study Design (3)
Lecture—20 sessions; discussion—6 sessions; laboratory—4 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Builds on concepts presented in course 405. Concepts of epidemiologic study design-clinical trials, observational cohort studies, case control studies-introduced in course 405 and covered in more depth, using a problem-based format. Discussion of published epidemiologic studies. (Same course as Epidemiology 206.)—II. (II.) Miller

408A. Veterinary Research: Planning and Reporting (2)
Lecture—20 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Planning, critical analysis, ethics, and written and oral communication of veterinary research.—Foley

408B. Veterinary Research: Planning and Reporting (1)
Lecture—10 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Planning, critical analysis, ethics, and written and oral communication of veterinary research.—I. (I.) Foley

410. Animal Health Policy and Risk Communication (1)
Discussion—10 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. International, national and state policy issues affecting veterinary medicine, how policy is made, organizational cultures, the role of science in policy-making, ten best practices in risk/crisis communication, message-mapping for the public and policy-makers, and effective meeting management.—I. (I.) Mazet

412. Introduction to Information Management (3)
Lecture—10 sessions; laboratory—20 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Introduction to information management. Emphasis on data quality and design of data applications. Specific topics include library fundamentals and managing human resources for project management, data collection, organization, storage, analysis and communication. Limited enrollment.—IV. (IV.)

426. Applied Epidemiologic Problem Solving (1)
Laboratory—10 sessions. Prerequisite: MPVM standing in the School of Veterinary Medicine or consent of instructor. Integration of epidemiologic and statistical methodology in a problem-solving approach to contemporary animal population health issues. Data validation and manipulation; descriptive statistical analysis using spreadsheets, database management, and Epi Info software. Builds on skills learned in courses 405L and 406.—II. (II.) Gardner

Surgical and Radiological Sciences (VSR)

Lower Division Course

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Course

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

298. Group Study (1-5)
Prerequisite: consent of instructor. (S/U grading only.)

299. Research (1-12)
Prerequisite: consent of instructor. (S/U grading only.)

Professional Courses

401. Small Animal Radiology Case Discussions (1)
Discussion—10 sessions. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine. The role of diagnostic radiology in the clinical setting and student interpretation of radiographs. May be repeated one time for credit. (S/U grading only.)—I, II, III. (I, II, III.) Spriet

402. Large Animal Radiology Case Discussions (1)
Discussion—10 sessions. Prerequisite: first-, second-, or third-year standing in the School of Veterinary Medicine. The role of diagnostic radiology in the clinical setting and student interpretation of radiographs. May be repeated one time for credit. (S/U grading only.)—I, II, III. (I, II, III.) Spriet

404A. Small Animal Radiology (2.9)
Lecture—17 sessions; discussion—12 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Registration in course 404A is required at the beginning of both winter and spring quarters for this two quarter course. Students may audit the course, but retroactive adds after the examination has been administered at the end of each quarter are not allowed. Course 404A is required for students who intend to rotate through the Small Animal Radiology Service during their senior year. Introduction to radiographic interpretation as it relates to muscoskeletal, thoracic, and abdominal disorders of small animals. Assignment of unknown cases as practice in interpreting radiographic patterns described in lecture. (Deferred grading only, pending completion of sequence.)—II, III. (II, III.) Zwingenberger

404B. Large Animal Radiology (1.6)
Lecture—12 sessions; discussion—4 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Radiographic manifestations of common equine orthopedic, upper airway and thoracic diseases. Common radiographic abnormalities in non-equine large animal patients. Equine and other large animal radiographic pattern recognition and differential diagnosis generation based on the identified pattern.—II. (II.) Puchalski

405. Advanced Small Animal Abdominal Ultrasound (2.1)
Lecture—12 sessions; discussion—6 sessions; laboratory—3 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. The use of ultrasound for the diagnosis of common clinical diseases in both the abdomen and thorax. Examination techniques of the thorax and the abdomen covered in the laboratory sessions and examples of the abnormal presented in discussion.—II. (II.) Pollard

406. Small Animal Diagnostic Ultrasound (1)
Lecture—7 sessions; discussion—1 session; laboratory—2 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. Ultrasound imaging principles.—I. (I.) Pollard

407R. Comparative Dentistry and Oral Surgery (2)
Discussion—2 hours. Prerequisite: residents in the Veterinary Medical Teaching Hospital; graduate students, veterinarians enrolled in training programs leading to board-certification in veterinary dentistry, AVDC Diplomates and dentists with consent of instructor. Review of current literature pertaining to comparative oral biology, surgery and medicine and related basic sciences; half of sessions based on topics assigned by course leader while other half consist of critical reviews of recent papers chosen by the participants. May be repeated one time for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Verstraete

408R. Diagnostic Imaging Journal Discussion (1)
Discussion—1 hour. Prerequisite: resident status at the Veterinary Medical Teaching Hospital. Review of current medical and veterinary diagnostic imaging literature. Focus on scientific methodology, content and relevance to clinical practice. May be repeated 12 times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Zwingenberger

409R. Known Case Conference—Imaging (1.5)
Discussion—15 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Film review of current and past Veterinary Medical Teaching Hospital proven cases. Intended for radiology residents and others with background in diagnostic imaging. May be repeated three times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Wisner

410R. Diagnostic Imaging: Wildlife & Special Species Rounds (0.4)
Discussion—4 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Restricted to residents in diagnostic imaging and other appropriate services. Film review of current and past wildlife and special species cases from Veterinary Medical Teaching Hospital and other locations. May be repeated 12 times for credit. (S/U grading only.)—I, II. III. (I, II, III.) Zwingenberger

411R. Small Animal Orthopedics Conference (0.9)
Discussion—9 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Current cases and literature pertaining to small animal orthopedics. (S/U grading only.)—
I, II, III, IV. (I, II, III, IV.) Kapatkin

413. Small Animal Dentistry (2.4)
Lecture—19 sessions; discussion—5 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Introduction to the principles of oral examination, pathophysiology and treatment of periodontitis, exodontics, basic oral soft tissue surgery dental emergencies, orthodontics, developmental and regressive dental conditions, endodontics, prosthodontics, advanced periodontal therapy, oral medicine and advanced oral surgery. (S/U grading only.)—II. (II.) Verstraete

413L. Small Animal Dentistry Lab (0.3)
Laboratory—3 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine; concurrent enrollment in course 413. Principles of oral examination, oral radiography, routine periodontal treatment and dental extraction techniques. (S/U grading only.)—II. (II.) Verstraete

415. Small Animal Orthopedics (1.5)
Lecture—13 sessions; laboratory—2 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Common conditions of small animal lameness and basic principles of small animal traumatology.—III. (III.) Kapatkin

416. Equine Ultrasonology (1)
Lecture—8 sessions; discussion—2 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Familiarize students with ultrasonographic diagnostic methodology and with ultrasonologic features of common diseases of the major equine organ systems.—III. (III.) Whitcomb

416L. Equine Ultrasonology Lab (0.4)
Laboratory—4 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine, concurrent enrollment in course 416. Familiarize students with ultrasonographic diagnostic methodology and with ultrasonologic features of common diseases of the major equine organ systems.—III. (III.) Whitcomb

418R. Topics in Surgery/Oncology (0.4)
Discussion—4 sessions. Prerequisite: resident status at the Veterinary Medical Teaching Hospital. Discussion of topics relevant to surgery and oncology with special focus on new treatments, recommendations, and modalities. May be repeated up to 16 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Kent

423. Diagnostic Ophthalmology (1.5)
Lecture—15 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor; successful completion of Veterinary Medicine 422. Pathogenesis and diagnosis of commonly encountered eye diseases of common domestic animals.—II. (II.) Maggs

424. Clinical Veterinary Oncology (1)
Lecture—10 sessions. Prerequisite: second-year standing in the School of Veterinary Medicine. The internal medicine subspecialty of oncology. Clinical considerations and basic tenets of tumor biology. (S/U grading only.)—I. (I.) Théon

425R. Veterinary Cancer Biology: Clinical Applications (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Survey of contemporary literature regarding the clinical management of important tumors in domestic animals and focus on diagnosis and treatment. (S/U grading only.)—I. (I.) Kent

426R. Veterinary Cancer Biology: Mechanisms of Disease (1)
Discussion—10 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital. Survey of contemporary literature regarding the biology of cancer with particular reference to mechanisms underlying tumorigenesis in domestic animals. (S/U grading only.)—III. (III.) Kent

427R. Oncology Journal Discussion (.75)
Discussion—.75 hours. Prerequisite: resident status at the Veterinary Medical Teaching Hospital. Review of current medical oncology and radiation oncology literature. Focus on scientific methodology, content and relevance to clinical practice. Covers both veterinary and human medical journals. May be repeated up to 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Skorupski

431R. Graduate Veterinary Neurology/ Neurosurgery (2)
Seminar—4 hours. Prerequisite: resident status in the Veterinary Medical Teaching Hospital or consent of instructor. Lectures/discussions/literature reviews of diagnosis and medical/surgical treatment of neurological diseases of animals to include relevant neurologic and neurosurgical topics from human medicine. May be repeated for credit up to 12 times for 24 units of credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Sturges, Vernau

432R. Advanced Veterinary Neurosurgery Seminar (1.5)
Lecture/laboratory—15 sessions. Prerequisite: resident status in Small Animal Surgery or Neurology/ Neurosurgery in the Veterinary Medical Teaching Hospital or consent of instructor. Overview of the diagnosis and treatment of neurological disease in small animals with an emphasis on neurosurgery. Laboratory sessions allow residents to develop familiarity with anatomical landmarks and the neurosurgical skills. May be repeated six times for credit. (S/U grading only.)—II, III. (II, III.) Sturges

433R. Clinical Neuromuscular/ Neuropathology Conference (1)
Seminar—1 hour. Prerequisite: resident status at the Veterinary Medical Teaching Hospital or consent of instructor. Case discussions and review of neuropathology and neuromuscular disease. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Sturges, K. Vernau

441R. Small Animal Emergency/Critical Care Journal Discussion (1)
Discussion—1 hour. Prerequisite: resident status at the Veterinary Medical Teaching Hospital. Review of current medical and veterinary emergency and critical care literature. Focus on scientific methodology, content and relevance to clinical practice. May be repeated 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Hopper

442R. Small Animal Emergency/Critical Care Physiology Rounds (3)
Seminar—3 hours. Prerequisite: resident status at the Veterinary Medical Teaching Hospital; consent of instructor. Review of physiology and topics pertinent

to small animal emergency and critical care. May be repeated twelve times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Burkitt

450R. Veterinary Ophthalmology Slide Review (1)
Discussion—1 hour. Prerequisite: resident in Veterinary Medical Teaching Hospital Ophthalmology program or consent of instructor. Review and critical evaluation of 35 mm projection slides involving clinical and microscopic depictions of normal and abnormal conditions seen in the field of veterinary ophthalmology. Discussion of current treatment modalities, diagnostic capabilities and other related and relevant issues. (S/U grading only.)—I, II, III. (I, II, III.) Maggs, Hollingsworth

451R. Veterinary Ophthalmology Literature Review (1)
Discussion—1 hour. Prerequisite: residents in Veterinary Medical Teaching Hospital Ophthalmology program or consent of instructor. Survey and critical evaluation of contemporary literature in or related to the field of veterinary ophthalmology. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Maggs, Hollingsworth

452R. Advanced Topics in Comparative Ophthalmology (1)
Discussion—1 hour. Prerequisite: residents in Veterinary Medical Teaching Hospital, specifically in the Ophthalmology program, or students with consent of instructor. Presentation and critical evaluation of advanced topics in or related to the field of comparative ophthalmology. May be repeated six times for credit. (S/U grading only.)—I, III. (I, III.) Murphy

453R. Advanced Topics in Molecular Biology and Biomaterials (1)
Discussion—1 hour. Prerequisite: residents in the Veterinary Medical Teaching Hospital or consent of instructor. Interdisciplinary discussion group focused on reviewing principles in cell and molecular biology and biomaterials science and the relevance to research projects concentrating on the cell (biotic) and biomaterial (abiotic) interface. May be repeated six times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Murphy, Pan

459R. Renal Transplantation (0.5)
Lecture/discussion—5 sessions. Prerequisite: resident status in the Veterinary Medical Teaching Hospital and consent of instructor required. Topics related to renal transplant cases. May be repeated up to 12 times for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Mehl

460. Emergency and Critical Patient Care (2)
Lecture—20 sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to the essential and practical concepts of care for emergency and critically ill patients.—III. (III.). Hopper, Mellema

462. Radiographic Diagnosis: Small Animal (1)
Lecture—1 session; discussion—9 sessions. Prerequisite: course 404A, third-year standing in the School of Veterinary Medicine. Small animal radiographic case studies. Presentation and discussion of assigned cases before knowing the actual diagnosis. (S/U grading only.)—III. (III.) Wisner

463. Soft Tissue Surgery (1.8)
Lecture—18 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Pathophysiology and surgical treatment of selected soft tissue diseases.—III. (III.) Hunt

464R. Principles of Veterinary Radiation Oncology (2)
Lecture—2 hours. Prerequisite: house officers in the Veterinary Medical Teaching Hospital. Graduate students or veterinary students with consent of instructor. Principles and practice of veterinary radiation therapy. Topics include physical methods of radiation therapy, biological effects of therapeutic radiation and applications in veterinary patients. (S/U grading only.) Offered in alternate years.—I. Théon

465R. Biology and Practice of Veterinary Radiation Oncology (2)
Lecture—2 hours. Prerequisite: house officers in the Veterinary Medical Teaching Hospital. Graduate students or veterinary students with consent of instructor. Principles and practice of veterinary radiation therapy. Topics include physical methods of radiation therapy, biologic effects of therapeutic radiation and applications in veterinary patients. (S/U grading only.) Offered in alternate years.—II. Théon

466. Large Animal Applied Anesthesiology (1.5)
Lecture—15 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of instructor. Applied clinical anesthesiology. Special techniques and consideration for anesthetizing a variety of species including horses, swine, ruminants, camelids, and large non-domestic species.—II. (II.) Brosnan

467. Small Animal Anesthesiology (2)
Lecture—20 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. The safe clinical administration of anesthetic drugs to small animals. Clinical applications, indications and contraindications, methods of use of common anesthetic drugs and techniques will be discussed.—II. (II.) Ilkiw

468. Equine Lameness and Radiology (4)
Lecture—40 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Principles for the clinical evaluation and radiographic interpretation of lameness disorders of the fore- and hindlimbs of horses. Methods used in large animal radiography and the latest techniques for managing and treating equine lameness. Anatomy and pathology of some areas of the musculoskeletal system.—III. (III.) MacDonald

468L. Equine Lameness and Radiology Laboratory (1.1)
Laboratory—11 sessions. Prerequisite: course 468 concurrently, third-year standing in School of Veterinary Medicine. Focus on clinical gait evaluation, and various diagnostic strategies for localizing lameness disorders in the fore- and hindlimbs of horses. Radiographs from clinical cases. Clinical evaluation and treatment of various disorders of the foot. Equine chiropractic and acupuncture therapy.—III. (III.) Galuppo

469. Equine Surgery (3)
Lecture—30 sessions. Prerequisite: third-year standing in the School of Veterinary Medicine. Appropriate methods of diagnosis for surgical diseases, provide an understanding of different treatment options, and develop a framework for establishing a prognosis for the disease considering particular uses of horses.—II. (II.) Nieto

469L. Equine Surgery Laboratory (1.4)
Laboratory—8 sessions; discussion—6 sessions. Prerequisite: course 469 concurrently, third-year standing in School of Veterinary Medicine. Common equine surgical procedures and other techniques useful in equine practice. (S/U grading only.)—II. (II.) Nieto

470R. Equine Surgery Journal Discussion (1)
Discussion—1 hour. Prerequisite: course 471R concurrently, resident in Veterinary Medical Teaching Hospital or consent of instructor. Current veterinary literature and other related topics in preparation for board certification in the American College of Veterinary Surgeons. Critical evaluation of journal articles for content, methodology and statistical methods. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Galuppo

471R. Equine Surgery Case Management Conference (1)
Discussion—1.5 hours. Prerequisite: course 470R concurrently, residents in Veterinary Medical Teaching Hospital or consent of instructor. Discussion of soft tissue, orthopedic and lameness clinical disorders that focus on pathophysiology of disease, appropriate treatment options, and evaluation of prognosis. Simulation of mock oral examination for the American College of Veterinary Surgeons board examination. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.) Galuppo

481R. Clinical Soft Tissue Surgery Conference (1)
Discussion—1 hour. Prerequisite: open to students with D.V.M. or equivalent degree who are residents in specialty training. Graduate students in a related discipline with consent of instructor. Review current medical literature and discuss presentation, diagnosis and treatment of small animal surgical conditions, review the morbidity and mortality of clinical cases and provide mock examinations in preparation for ACVS specialty boards. May be repeated for credit. (S/U grading only.)—I, II, III, IV. (I, II, III, IV.)

491R. Anesthesia/Critical Care Basic Science Management Conference (2)
Discussion—20 sessions. Prerequisite: residents in the Veterinary Medical Teaching Hospital or consent of instructor. Physiology, pharmacology and clinical practice as it relates to anesthetic management of veterinary patients. May be repeated three times for credit. (S/U grading only.)—I, II. III. (I, II, III.) Pypendop

493R. Anesthesia/Critical Care Case Management Conference (0.8)
Discussion—0.8 hours. Prerequisite: residents in the Veterinary Medical Teaching Hospital or consent of instructor. Discussion of Veterinary Medical Teaching Hospital case material to illustrate specific medical problems and their preventive and corrective management as it pertains to anesthesia and critical care. May be repeated three times for credit. (S/U grading only.)—I, II. III. (I, II, III.) Pypendop

494R. Anesthesia/Critical Patient Care Journal Discussion (1)
Discussion—1 hour. Prerequisite: resident status at the Veterinary Medical Teaching Hospital. Review of current medical and veterinary anesthesia literature. Discussion will focus on scientific methodology, content and relevance to clinical practice. May be repeated 16 times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Pypendop

495R. Large Animal Ultrasound Journal Discussion (1)
Discussion—1 hour. Prerequisite: intern/fellow status in Large Animal Ultrasound at the Veterinary Medical Teaching Hospital. Review of current medical and veterinary diagnostic imaging literature with a focus on large animal ultrasonography. Emphasis is on scientific methodology, content and relevance to clinical practice. May be repeated 12 times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Vaughan, Whitcomb

496R. Large Animal Ultrasound Case Conference (2)
Discussion—2 hours. Prerequisite: intern/fellow status in Large Animal Ultrasound at the Veterinary Medical Teaching Hospital. Discuss VMTH large animal ultrasound case material to illustrate specific surgical, medical and lameness problems. May be repeated 12 times for credit. (S/U grading only.)—I, II, III. (I, II, III.) Vaughan, Whitcomb

Viticulture and Enology

(College of Agricultural and Environmental Sciences)

Andrew L. Waterhouse, Ph.D., Chairperson of the Department

Department Office. 1162 RMI North Building (530) 752-0380; *http://wineserver.ucdavis.edu*

Faculty

Douglas O. Adams, Ph.D., Professor
Linda F. Bisson, Ph.D., Professor
David E. Block, Ph.D., Professor
(Viticulture and Enology, Chemical Engineering)
Academic Senate Distinguished Teaching Award
Roger B. Boulton, Ph.D., Professor
(Viticulture and Enology, Chemical Engineering)
Susan E. Ebeler, Ph.D., Professor
Hildegarde Heymann, Ph.D., Professor
Mark A. Matthews, Ph.D., Professor
David A. Mills, Ph.D., Professor
David R. Smart, Ph.D., Associate Professor
M. Andrew Walker, Ph.D., Professor
Andrew L. Waterhouse, Ph.D., Professor
Larry E. Williams, Ph.D., Professor

Emeriti Faculty

L. Peter Christensen, Specialist in Cooperative Extension, Emeritus
W. Mark Kliewer, Ph.D., Professor Emeritus
Ralph E. Kunkee, Ph.D., Professor Emeritus
Lloyd A. Lider, Ph.D., Professor Emeritus
Carole P. Meredith, Ph.D., Professor Emerita
Ann C. Noble, Ph.D., Professor Emerita
Cornelius S. Ough, D.Sc., Professor Emeritus
Vernon L. Singleton, Ph.D., Professor Emeritus
Academic Senate Distinguished Teaching Award

Affiliated Faculty

Matthew W. Fidelibus, Ph.D., Associate Specialist in Cooperative Extension
James T. Lapsley, Ph.D., Associate Adjunct Professor
Andrew J. McElrone, Ph.D., Assistant Adjunct Professor
Kerri L. Steenwerth, Ph.D., Assistant Adjunct Professor
James A. Wolpert, Ph.D., Specialist in Cooperative Extension

The Major Program

The Viticulture and Enology major provides an interdisciplinary education in the biological and physical principles underlying grape and wine production as well as practical knowledge of grape growing (viticulture) and wine making (enology). This program provides the knowledge base for problem-solving and decision-making in commercial grape and wine production.

Preparatory Requirements. Before transferring into the Viticulture and Enology major, students must complete the following courses with a grade of *C-* or better and with a combined grade point average of at least 2.500 at the University of California (at least 3.000 for similar courses taken at community college) for these and all other preparatory courses. In addition, students' overall UC GPA must be 2.250 or higher. All courses must be taken for a letter grade.

Biological Sciences 1A or 2A ..... 4-5 units
Chemistry 2A, 2B, 2C, 8A ..... 17 units
Mathematics 16A ..... 3 units
Physics 1A, 1B or 7A ..... 4-6 units

Recommendations. Completion of UC Davis equivalents of the following preparatory courses for the major are not required for entry but are highly recommended. Failure to complete these will delay entry into required upper division courses and may thus delay graduation. Some courses may be available at UC Davis during Summer Session:

Chemistry 8B ..... 4 units
Mathematics 16B ..... 3 units
Biological Sciences 1C or Plant Sciences 2 ..... 4-5 units
Biological Sciences 102 ..... 3 units

The Program. The curriculum builds upon a foundation of biology, chemistry, biochemistry and mathematics with specialized courses related to grape and wine production. To complete the program, students may choose to place particular emphasis on viticulture, enology or economics. Credit may also be earned for foreign language study and internships.

Career Alternatives. Graduates are qualified for a variety of vineyard and winery positions, including production management, quality control and research. Additionally they may work in related fields such as pest management, nursery production and analytical services.

B.S. Major Requirements:

UNITS

Preparatory Subject Matter 44-51

Biological Sciences 1A or 2A and1C or Plant Sciences 2 8-10
Chemistry 2A-2B-2C 15
Chemistry 8A, 8B 6
Plant Sciences 21 or equivalent and adviser approval 0-3
Mathematics 16A-16B 6
Physics 1A, 1B or 7A 4-6
Viticulture and Enology 2, 3 5

Depth Subject Matter 48-54

Biological Sciences 102, 103 or 105 3-6
Microbiology 102, 102L or 101 5-7
Plant Sciences 120 or Statistics 106 4
Viticulture and Enology 101A, 101B, 101C, 110, 118 15
Viticulture and Enology 123, 124, 125, 126, 128, 135 and in consultation with the adviser, choose 3 of the following courses: 123L, 124L, 125L, 126L, 128L. If more than 3 are taken, the extra courses will count as restricted electives in Area B 21-22

Restricted Electives 28

In consultation with adviser, choose 28 units from three of the following five areas. At least 12 units must be from one of the following areas: *(A)* Plant Science, *(B)* Food Science and Microbiology, or *(C)* Economics and Business.

(A) Plant Science area: Applied Biological Systems Technology 142, 145, 147, 175, 180, Atmospheric Science 133, Biological Sciences 101, Biotechnology 160, Entomology 110, Hydrologic Science 110, 124, Molecular and Cellular Biology 126, Nematology 100, Plant Biology 111, 112, 123, 143, 172, 172L, Plant Pathology 120, Plant Sciences 142, 146, 154, 157, 158, 171, 176, Soil Science 100, 102, 109, 118, Viticulture and Enology 111.

(B) Food Science and Microbiology area: Biological Sciences 101, Food Science and Technology 102A, 102B, 104, 104L, 108, 109, 110A, 110B, 127, Microbiology 140, 150, 155L, Viticulture and Enology 140.

(C) Economics and Business area: Agricultural and Resource Economics 100A, 112, 113, 118, 130, 140, 150, Economics 1A, 1B, Management 11A, 11B, Viticulture and Enology 111, 130

(D) Language area: Maximum 12 units, not counting course 1, of one of the following languages: French, German, Italian, Portuguese or Spanish. At least one course must be Intermediate or Conversational; qualifying Intermediate or Conversational courses are listed below:
French 8, 21, 22, 23, 38, German 6, 11, 20, 21, 22, Italian 4, 5, Spanish 8, 21, 22, 28, 31, 32, 33.
Courses taught in English will not count as restricted electives in this major.

(E) Internship area: A maximum of 8 units of Viticulture and Enology 190X, 192, 198, 199, 290 or 298 may be counted as restricted electives by prior arrangement with adviser. May be increased to 12 units in exceptional circumstances.

Total Units for the Major 120-133

Major Adviser. M. Matthews

Related Major Programs. Food Science and Technology, and Plant Sciences.

Graduate Study. Several graduate groups offer programs of study leading to advanced degrees in the fields of viticulture and enology. For the M.S. or Ph.D. degree, see Agricultural and Environmental Chemistry (A Graduate Group), on page 139, Engineering: Chemical Engineering and Materials Science, on page 246, Ecology (A Graduate Group), on page 218, Food Science (A Graduate Group), on page 305, Genetics (A Graduate Group), on page 312, Horticulture and Agronomy (A Graduate Group), on page 333, Microbiology (A Graduate Group), on page 413, Plant Biology (A Graduate Group), on page 458, Plant Pathology, on page 460, Soils and Biogeochemistry (A Graduate Group), on page 494, and Viticulture and Enology (A Graduate Group), on page 532.

Courses in Viticulture and Enology (VEN)

Lower Division Courses

2. Introduction to Viticulture (2)
Lecture—2 hours. Fundamental principles of biology and culture of the grapevine including taxonomy, morphology, physiology, distribution, domestication, utilization, propagation, production systems, harvesting, and storage and processing of grapes. Successful completion of the course should prepare students for upper division courses in viticulture.—I. (I.) Williams

3. Introduction to Winemaking (3)
Lecture—3 hours. Overview of the history of wine, viticulture, fermentation, winery operations, the physiology of wine consumption, wines produced in California and other major wine-producing regions and the sensory evaluation of wine. GE credit: SciEng or SocSci.—I, II, III. (I, II, III.) Heymann, Waterhouse, Adams

90X. Lower Division Seminar (2)
Seminar—1 hour; term paper (required)/discussion. Prerequisite: lower division standing and consent of instructor. Introduction to current issues surrounding wine and health as they relate to diet, nutrition, and toxicology. May not be repeated for credit. GE credit: Wrt.

99. Special Study for Undergraduates (1-5)
(P/NP grading only.)

Upper Division Courses

101A. Viticultural Practices (3)
Lecture—1.5 hours; discussion/laboratory—3.5 hours. Prerequisite: course 2. Identification, cultivation, and use of the major wine, table, raisin, and rootstock cultivars. Includes practices specific to the fall such as fruit contracts, maturity sampling, harvesting, cover crops, and soil-pests. One field trip required.—I. (I.) Walker

101B. Viticultural Practices (3)
Lecture—1.5 hours; discussion/laboratory—3.5 hours. Prerequisite: course 2. Theory, principles, and practices of pruning and grapevine propagation. Plant materials and the certification process, weed control and weed identification, wood diseases, and frost protection. One field trip required.—II. (II.) Walker

101C. Viticultural Practices (3)
Lecture—1.5 hours; discussion/laboratory—3.5 hours. Prerequisite: course 2. Field oriented experience in the principles and practices of grapevine production, including vineyard establishment, vine training, trellising, canopy management practices, irrigation and water management, and methods of crop adjustment for improvement of fruit quality. One field trip required.—III. (III.) Smart

110. Grapevine Growth and Physiology (3)
Lecture—3 hours. Prerequisite: course 2. Botanical aspects including morphology and domestication will precede lectures covering flower development and energy budget concepts. Impact of physiological variables such as photosynthesis translocation, mineral nutrition, and water relations on fruit ripening and composition will be covered.—II. (II.) Matthews

111. World Viticulture (3)
Lecture—3 hours. Prerequisite: upper division standing. Study of the diversity of viticulture, both geographical and historical. History of grape growing and its spread throughout the world will be covered, along with discussions of current viticultural practices in different parts of the world, including California.

111L. Critical Evaluation of Wines of the World (1)
Laboratory/discussion—3 hours. Prerequisite: course 111 (must be taken concurrently), course 125 with a grade of C or better. Critical analysis of wines produced in different parts of the world with emphasis on the relationship between sensory properties of the wines and factors associated with their place of origin. (P/NP grading only.)

115. Raisin and Table Grape Production (2)
Lecture—2 hours. Prerequisite: course 2. Overview of the raisin and table grape industries in California and other production areas of the world. Cultural practices associated with raisin and table grape production will also be discussed.—I. (I.) Williams

118. Grapevine Pests, Diseases and Disorders (3)
Lecture—3 hours. Prerequisite: course 2. Various pests and diseases of vineyards throughout California. Pest/disease identification and control methods (to include sampling techniques) also will be discussed. Integrated management approach to pest control methods will be emphasized.—I. (I.) Williams

123. Analysis of Musts and Wines (2)
Lecture—2 hours. Prerequisite: Chemistry 2C and 8B or equivalent; Agricultural Management and Rangeland Resources 21 or equivalent. Students enrolled in the lecture only portion of the course will be required to enroll in 1 unit of course 199/299. Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking.—I. (I.) Ebeler

123L. Analysis of Musts & Wines Laboratory (2)
Lab—3 hours; independent study—3 hours. Prerequisite: Chemistry 2C and 8B, or equivalent, Agricultural Management and Rangeland Resources 21, and course 123 (course 123 may be taken concurrently). Fundamental principles of analytical chemistry as they relate to specific methods used in winemaking. Laboratory exercises demonstrating various chemical, physical and biochemical methods. Data will be analyzed and results interpreted in weekly lab reports; includes student-designed independent project and written report. Enrollment restricted to upper division and graduate students in Viticulture & Enology; others by approval of instructor. GE Credit: Wrt.—I. (I.) Ebeler

124. Wine Production (2)
Lecture—2 hours. Prerequisite: course 3, 123 (may be taken concurrently), Biological Sciences 102. Principles and practices of making standard types of wines, with special reference to grape varieties used and methods of vinification.—I. (I.) Bisson

124L. Wine Production Laboratory (3)
Laboratory—3 hours; independent study—3 hours; term paper. Prerequisite: course 124 (may be taken concurrently). Restricted to undergraduate students in fermentation science, viticulture and enology, biotechnology, microbiology, food science and applied plant biology or graduate students in food science, agricultural and environmental chemistry and horticulture. Current technologies used in production of California table wines; analysis and monitoring of impact of fermentation variables on microbial performance and product quality; student-designed independent research project.—I. (I.) Bisson

125. Wine Types and Sensory Evaluation (2)
Lecture—2 hours. Prerequisite: course 124; Plant Sciences 120 or Statistics 106. Open to upper division and graduate students in Viticulture & Enology; others by approval of instructor. Principles of sensory evaluation and application to wines. Factors influencing wine flavor, data from sensory analysis of model solutions.—III. (III.) Heymann

125L. Sensory Evaluation of Wine Laboratory (2)
Laboratory—3 hours; term paper. Prerequisite: course 125 (may be taken concurrently). Restricted to upper division majors in fermentation science or viticulture and enology or graduate students in food science. Sensory evaluation of wines and model systems using discrimination tests, ranking, descriptive analysis and time-intensity analysis. Data analyzed by appropriate statistical tests and results interpreted in extensive weekly lab reports.—III. (III.) Heymann

126. Wine Stability (3)
Lecture—2 hours; discussion—1 hour. Prerequisite: course 124. Restricted to students in viticulture and enology, fermentation science, applied plant biology majors, or graduate students in food science, microbiology, horticulture, and horticulture and agronomy. Principles of equilibria and rates of physical and chemical reactions in wines; treatment of unstable components in wines by absorption, ion exchange, refrigeration, filtration, and membrane processes; and protein, polysaccharide, tartrate, oxidative, and color stabilities.—II. (II.) Boulton

126L. Wine Stability Laboratory (2)
Laboratory—3 hours; independent study—3 hours. Prerequisite: course 126 (may be taken concurrently). Restricted to upper division fermentation science, viticulture and enology majors, or graduate students in food science, agricultural and environmental chemistry, microbiology or by consent of instructor. Practical application of principles of equilibria and rates of physical and chemical reactions to wine stability.—II. (II.) Boulton

128. Wine Microbiology (2)
Lecture—2 hours. Prerequisite: courses 123 and 124; Microbiology 102 and 102L, or Food Science and Technology 104 and 104L; courses 125 and 126 recommended. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging and spoilage of wine.—II. (II.) Mills

128L. Wine Microbiology Laboratory (2)
Laboratory—6 hours. Prerequisite: course 123, 124, and 128 (may be taken concurrently), Microbiology 102L or Food Science and Technology 104 and 104L; course 125 and 126 recommended. Restricted to upper division students in fermentation science, viticulture and enology or graduate students in food science. Nature, development, physiology, biochemistry and control of yeasts and bacteria involved in the making, aging and spoilage of wine.—II. (II.) Mills

135. Wine Technology and Winery Systems (5)
Lecture—3 hours; discussion/laboratory—2 hours. Prerequisite: course 124. Process technologies and process systems that are used in modern commercial wineries. Lectures, demonstrations, problem solving sessions, and possible field trips. Includes grape preparation and fermentation equipment; post-fermentation processing equipment; winery utilities, cleaning systems, and waste treatment.—III. (III.) Block

140. Distilled Beverage Technology (3)
Lecture—3 hours. Prerequisite: Chemistry 8B; Food Science and Technology 110A. Distillation principles and practices; production technology of brandy, whiskey, rum, vodka, gin, and other distilled beverages; characteristics of raw materials, fermentation, distillation, and aging. Offered in alternate years.—(III.) Boulton

181. Readings in Enology (1)
Discussion—1 hour. Prerequisite: course 3. Critical evaluation of selected monographs in enology. Discussion leadership rotates among the students. May be repeated three times for credit. (P/NP grading only.)—III. (III.) Matthews

190X. Winemaking Seminar (1)
Seminar—1 hour; discussion—1 hour. Prerequisite: course 3. Open to Viticulture and Enology majors and graduate students. Outside speakers on a specific winemaking topic chosen for the quarter. Discussion with the speaker hosted by the faculty member(s) in charge. May be repeated for credit up to 3 times. (P/NP grading only.)—III. (III.)

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be approved and supervised by a member of the department or major faculty, but are arranged by the student. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

200. Introduction to Scientific Methods (2)
Lecture/discussion—1 hour; term paper. Prerequisite: graduate standing or consent of instructor. Processes involved in conducting scientific research. Topics include conducing literature review, formulating hypotheses, and analyzing and reporting results. Annotated bibliography and written and oral research proposal.

210. Grape Development and Composition (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 102 and 103, or 105. Anatomy, physiology and biochemistry of grape berry development, with emphasis on the development of grape composition relevant to winemaking. Offered in alternate years.—III. Adams, Polito

213. Flavor Chemistry of Foods and Beverages (3)
Lecture/discussion—3 hours. Prerequisite: Chemistry 8B, course 123, course 123L or Food Science and Technology 103 or consent of instructors. Students will become familiar with basic principles of flavor chemistry, analysis, and formation in fresh and processed foods. Students will be required to read and critically evaluate flavor chemistry literature. (Same course as Food Science and Technology 213).—III. (III.) Ebeler, Heymann

215. Sensometrics (3)
Lecture—3 hours. Prerequisite: Food Science and Technology 117 or the equivalent, course 125 and 125L or Food Science and Technology 107A or 107B. Experimental design and statistical analysis, including multivariate analysis, for both sensory and instrumental data in enology and food-related studies.—I. (I.) Heymann

216. Vineyard Establishment and Development (4)
Lecture/discussion—3 hours; fieldwork—3 hours; term paper. Prerequisite: courses 101A, 101B, 101C, and one of courses 115 or 116, and course 118 or consent of instructor; course 110, Soil Sci-

ence 100, Atmospheric Science 133 and Agricultural and Resource Economics 140 recommended. Application of plant, meteorological, soil, water, and economic sciences to vineyard establishment and development. Preparation of a comprehensive study to determine the viticultural and economic feasibility of a given site for raisin, table, or wine grape production.—I. (I.) Smart

219. Natural Products of Wine (3)
Lecture—3 hours. Prerequisite: courses 123 and 124, or natural products background and consent of instructor. Structure, occurrence, and changes due to wine production to the natural products found in wine. Chemicals with a sensory impact will be emphasized, including flavonoids and other phenolics, terpenes and norisoprenoids, pyrazines, oak volatiles and other wine constituents.—I. (I.) Waterhouse

223. Instrumental Analysis of Must and Wine (4)
Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 123 or Food Science and Technology 103; Biological Sciences 102, Chemistry 107B or 115 recommended. Open to upper division students in Fermentation Science, Viticulture and Enology, or graduate students in Food Science, Agricultural and Environmental Chemistry or Viticulture and Enology. Theory and practice of instrumental analysis of wines and musts. Emphasis on the principles of analytical techniques (e.g., CE, GC, HPLC, Mass Spectrometry) and factors determining correct choice of instrumental method.—III. (III.) Ebeler

224. Advances in the Science of Winemaking (3)
Lecture—3 hours. Prerequisite: course 125, 126 and graduate standing or consent of instructor. Selected topics in the science and technology of winemaking. Topics drawn from current research of participating faculty. Critical analysis of the technical content of published material.—III. (III.)

225. Advanced Sensory Analysis of Wines (3)
Lecture/discussion—2 hours; laboratory—4 hours. Prerequisite: courses 124 and 125 (or Food Science and Technology 107) and Agricultural Management and Rangeland Resources 120 or the equivalent. Sensory descriptive analysis experiments will be designed and conducted using standard sensory science methods. Data will be analyzed by analyses of variance, principal component analyses and generalized Procrustes analysis to evaluate the judge's performance and interpret the significance of the results.—III. Heymann

235. Winery Design (4)
Lecture—2 hours; discussion—1 hour; independent study. Prerequisite: course 124, 135 or consent of instructor. Design of wineries. Includes process calculations, equipment selection, process layout and building choice and siting. Project scheduling, capital costs, and ten-year cash flow analysis for the winery. One field trip required. Offered in alternate years.—II. Boulton

270. Critical Evaluation of Scientific Literature (2)
Discussion—2 hours. Prerequisite: consent of instructor. Contemporary research topics in biological sciences. Discussion of recent research articles in a special topic area. Intended to develop skills in critical evaluation of scientific publications. May be repeated for credit. (S/U grading only.)—II, III. (II, III.) Bisson

290. Seminar (1)
Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)—I, III. (I, III.)

290C. Advanced Research Conference (1)
Discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Planning and results of research programs, proposals, and experiments. Discussion and critical evaluation of original research being conducted by the group. Discussion led by individual research instructors for research group. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

291. Advanced Viticulture (2)
Lecture/discussion—2 hours. Prerequisite: course 110, 116, 124, 125; course 210 recommended. Critical evaluation of scientific and popular literature on selected topics of current interest that relate viticulture to fruit or wine sensory attributes or quality. May be repeated one time for credit. Offered in alternate years.—(II.) Matthews

292. Advanced Internship (1-15)
Internship—3-45 hours. Prerequisite: courses 123, 123L, 124, 124L, 125, 125L, 126, 126L, 128, 128L; consent of instructor. Restricted to Viticulture & Enology Graduate Group graduate students. Work experience related to Fermentation Science (Enology) or Plant Science (Viticulture) majors. Internships must be approved and supervised by a graduate group faculty member or students major professor, but are arranged by the student. May be repeated 12 units for credit. (S/U grading only.)—I, II, III. (I, II, III.)

297T. Tutoring in Viticulture and Enology (1-5)
Prerequisite: graduate standing and consent of instructor. Designed for graduate students who desire teaching experience, but are not teaching assistants. Student contact primarily in laboratory or discussion sections, and under direction of a faculty member. (S/U grading only.)

298. Group Study (1-5)
(S/U grading only.)

299. Research (1-12)
(S/U grading only.)

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.) I, II, III. (I, II, III.)

Viticulture and Enology (A Graduate Group)

Douglas O. Adams, Ph.D., Chairperson of the Group

Group Office. 1204 RMI South
(530) 752-8035; Fax (530) 752-0382;
http://wineserver.ucdavis.edu

Faculty

Douglas O. Adams, Ph.D., Professor
(Viticulture and Enology)
Charles W. Bamforth, Ph.D., Professor
(Food Science and Technology)
Linda F. Bisson, Ph.D., Professor
(Viticulture and Enology)
David E. Block, Ph.D., Professor
(Viticulture and Enology, Chemical Engineering)
Academic Senate Distinguished Teaching Award
Roger B. Boulton, Ph.D., Professor
(Viticulture and Enology, Chemical Engineering)
Susan E. Ebeler, Ph.D., Professor
(Viticulture and Enology)
Jean-Xavier Guinard, Ph.D., Professor
(Food Science and Technology)
Hildegarde Heymann, Ph.D., Professor
(Viticulture and Enology)
Mark A. Matthews, Ph.D., Professor
(Viticulture and Enology)
David A. Mills, Ph.D., Professor
(Viticulture and Enology)
Kenneth A. Shackel, Ph.D., Professor *(Plant Sciences)*
David R. Smart, Ph.D., Associate Professor
(Viticulture and Enology)
Li, Tian, Ph.D., Assistant Professor *(Plant Sciences)*
Jean S. VanderGheynst, Ph.D., Professor
(Biological and Agricultural Engineering)
M. Andrew Walker, Ph.D., Professor
(Viticulture and Enology)
Andrew L. Waterhouse, Ph.D., Professor
(Viticulture and Enology)
Larry E. Williams, Ph.D., Professor
(Viticulture and Enology)

Affiliated Faculty

Matthew W. Fidelibus, Ph.D., Associate Specialist in Cooperative Extension *(Viticulture and Enology)*
W. Douglas, Gubler, Ph.D., Cooperative Extension Plant Pathologist *(Plant Pathology)*
Andrew J. McElrone, Ph.D. Assistant Adjunct Professor *(Viticulture & Enology)*
Kerri L. Steenwerth, Ph.D., Assistant Adjunct Professor *(Viticulture and Enology)*
James A. Wolpert, Ph.D., Cooperative Extension Specialist *(Viticulture & Enology)*

Graduate Study. The M.S. program offers advanced studies in viticulture and enology, ranging from the genetics, physiology and biochemistry of grapevines to the chemistry, microbiology and sensory science of wines and the chemical engineering of winemaking. Graduate students will usually work on a project that requires at least two of these fields of science and may involve grapevines, grapes, and wine or wine distillates. Topics can vary; examples include the molecular biology of grapevines, bacteria or yeast, the grape and wine chemistry associated with fermentation and aging and the correlation of analytical and sensory analyses. All application material must be received in the Group office by January 15.

Ph.D. studies are offered through one of the following Graduate Groups: Agricultural and Environmental Chemistry, Chemical Engineering, Food Science, Horticulture and Agronomy, Genetics, Microbiology, and Plant Biology.

Preparation. Applicants to the program are required to have a level of competence equivalent to that of a strong science undergraduate program. This includes coursework in biology, general chemistry, organic chemistry, calculus, statistics (analysis of variance), biochemistry, and microbiology. Specific requirements are outlined in detail and may be obtained from the Group office or see *http://wineserver.ucdavis.edu*.

Graduate Advisers. H. Heymann, D.A. Mills

War–Peace Studies

(College of Letters and Science)

The interdisciplinary minor in War-Peace Studies examines the causes and dynamics of intra- and international wars and efforts to prevent and settle such conflicts.

Students in the minor are encouraged to participate in the educational activities of the Davis Program of the UC Institute on Global Conflict and Cooperation (IGCC).

The minor is sponsored by the International Relations Program.

Minor Program Requirements:

	UNITS
War-Peace Studies	**19-20**
One or two courses from each of the following areas:	
Approaches: Anthropology 123AN, 126B, Comparative Literature 157, Philosophy 115, 118, Political Science 121, 123, 124, 132, 176, Sociology 157, Women's Studies 102	
Northern and Western Regions: History 134A, 138C, 142A, 143, 144A, 144B,	

145, 170B, 171B, 174B, Native American Studies 130B, Political Science 130, 131
Southern and Eastern Regions: Anthropology 142, 143A, 143B, 144, History 165, 191F, 194C, Native American Studies 120, Political Science 142A

Restriction. No more than two courses from a single department may be offered in satisfaction of the minor requirements.

Advising. International Relations Program (530) 754-8098

Water Science

See Hydrologic Sciences (A Graduate Group), on page 338; Hydrology, on page 339; and Soil and Water Science, on page 494.

Wildlife, Fish, and Conservation Biology

(College of Agricultural and Environmental Sciences)

Douglas A. Kelt, Ph.D., Chairperson of the Department

Department Office. 1088 Academic Surge (530) 752-6586; *http://wfcb.ucdavis.edu*

Faculty

Louis W. Botsford, Ph.D., Professor
Tim Caro, Ph.D., Professor
John M. Eadie, Ph.D., Professor
Deborah L. Elliott-Fisk, Ph.D., Senior Lecturer
Nann A. Fangue, Ph.D., Assistant Professor
Douglas A. Kelt, Ph.D., Professor
A. Peter Klimley, Ph.D., Adjunct Professor
Peter B. Moyle, Ph.D., Professor
Brian D.Todd, Ph.D., Assistant Professor
Dirk H. Van Vuren, Ph.D., Professor

Emeriti Faculty

Daniel W. Anderson, Ph.D., Professor Emeritus
Joseph J. Cech, Jr., Ph.D., Professor Emeritus
Ronald E. Cole, B.S., Lecturer Emeritus
Christopher M. Dewees, Ph.D., Specialist in Cooperative Extension Emeritus, Lecturer Emeritus
Don C. Erman, Ph.D., Professor Emeritus
Nancy A. Erman, M.S., Lecturer Emerita
E. Lee Fitzhugh, Ph.D., Specialist in Cooperative Extension Emeritus
Walter E. Howard, Ph.D., Professor Emeritus
Rex E. Marsh, A.B., Lecturer Emeritus

Affiliated Faculty

Terrell P. Salmon, Ph.D., Specialist in Cooperative Extension
Lisa C. Thompson, Ph.D., Associate Specialist in Cooperative Extension

The Major Program

The Wildlife, Fish, and Conservation Biology major deals with the relationships between the requirements of wildlife and the needs of people. Understanding these relationships is vital for the maintenance of ecological diversity, recreational resources, and food supplies. Students completing the major possess a broad knowledge of ecology and natural history, but with the quantitative skills to use this knowledge in critical thinking and decision-making.

The Program. The major emphasizes broad training in biological and physical sciences, with specialization in one of five areas. The major is primarily for students interested in becoming professionals in the diverse and cutting edge fields of wildlife, fish, and conservation biology. The breadth of course requirements, when combined with electives, make this an excellent preparatory major for such areas as veterinary medicine and secondary school teaching. Certification by professional societies such as The Wildlife Society, American Fisheries Society, or the Ecological Society of America, or preparation for specialized resource-related graduate studies may also be achieved by careful planning of electives with a faculty adviser.

Career Alternatives. The major prepares students to excel in the dynamic fields of environmental and conservation biology emphasizing vertebrate animals in their natural environments, as well as resolution of conflicts between humans and wild animals. Positions now held by graduates in this major include wildlife biology, fisheries biology, wildlife damage management, and resource biologists and managers with local, state, and federal agencies. Some graduates are biologists or consultants with private industries such as environmental consulting firms, commercial fishing businesses, electrical utilities, sporting clubs or businesses, and aquaculture operations, while others are veterinarians, medical physicians, and professors/researchers who teach and/or conduct research in academic institutions.

B.S. Major Requirements:

UNITS

Written/Oral Expression 8

University Writing Program 1 4
Communication 1 4
Above requirements simultaneously satisfy the College requirements.

Preparatory Subject Matter 49-50

Biological Sciences 2A, 2B, 2C 14
Chemistry 2A, 2B, 8A, 8B 16
Mathematics 16A, 16B 6
Physics 1A, 1B 6
Statistics 100, 102, or Plant Sciences 120 4
Wildlife, Fish, and Conservation Biology 10, 11, or 50 3-4

Depth Subject Matter 47-54

Students graduating with this major are required to attain at least a C average (2.000) in all courses taken at the university in depth subject matter.
Environmental Science and Policy 100 or Evolution and Ecology 101 4
Evolution and Ecology 100 4
Biological Sciences 101 4
Wildlife, Fish, and Conservation Biology 121 or 130 4
Neurobiology, Physiology, and Behavior 102 or Wildlife, Fish, and Conservation Biology 141 4
Wildlife, Fish, and Conservation Biology 122 4
Wildlife, Fish, and Conservation Biology 154 4
Choose three lecture courses and two (laboratory) courses from Wildlife, Fish, and Conservation Biology 110, (110L), 111, (111L), 120, (120L), or Evolution and Ecology 134, (134L) 12-15
Choose one course (two recommended) from Statistics 104, 106, or 108 3-4
Wildlife, Fish, and Conservation Biology 100, or 101 & 101L, or 102 & 102L 4-7
Strongly recommended, but not required
Applied Biological Systems Technology 180 or Plant Sciences 180 4
Strongly recommended, but not required
Anatomy, Physiology and Cell Biology 100 4

Restricted Electives 15-24

Choose one from the nine Areas of Specialization shown below. Students must maintain a *C* average (2.000 GPA) and pass all course work in their chosen specialization.

Areas of Specialization

(1) Conservation Biology: Complete Wildlife, Fish, and Conservation Biology 155 & 155L.
Choose one course from Environmental Science and Policy 161, 166, 170, or 171.
Choose two courses from Environmental Horticulture 160, Environmental Science and Policy 127, Evolution and Ecology 115, 117, 138, 147, Wildlife, Fish, and Conservation Biology 152, 156, or 157.
Choose one course from Animal Science 103, Nature and Culture 120, 140, or Veterinary Medicine 170.

(2) Fish Biology: Complete Wildlife, Fish, and Conservation Biology 120 & 120L.
Choose one course from Entomology 116 or Evolution and Ecology 112 & 112L.
Choose three courses from Animal Science 118, Environmental Science and Policy 116, 150C, 151, 151L, Evolution and Ecology 115, Environmental and Resource Sciences 100, Hydrology 143, Wildlife, Fish, and Conservation Biology 155 & 155L, or 157.
Choose one course from Hydrology 150, Environmental Science and Policy 161, 169, or Plant Sciences 180.

(3) Wildlife Biology: Complete Wildlife, Fish, and Conservation Biology 151
Choose one course from Plant Biology 102, 144, 147, or 178.
Choose one course from Agricultural Management and Rangeland Resources 130, Environmental Horticulture 160, Environmental Science and Policy 155, Wildlife, Fish, and Conservation Biology 155 & 155L, 156, or 157.
Choose two courses from Animal Science 104, Environmental Science and Policy 121, Environmental Toxicology 101, Evolution and Ecology 107, Medical Microbiology 116, Plant Sciences 180, Wildlife, Fish, and Conservation Biology 136, 141 (cannot be used to simultaneously satisfy the Depth Subject Matter requirement), or 152.
Note: Students interested in certification as a Wildlife Biologist from The Wildlife Society should consider additional courses in plant sciences. Recommended courses include Plant Biology 108, 117, 118, 119, 148, Plant Sciences 131, 144, 145, or 178.

(4) Wildlife Health: Complete either Biological Sciences 102 and 103 or Animal Biology 102 and 103.
Choose one course from Wildlife, Fish, and Conservation Biology 136, 151, 152, or 155 &155L.
Choose one course from Animal Science 103, 170, Nature and Culture 120 or 140.
Choose one course from Anatomy, Physiology, and Cell Biology 100, Animal Science 104, Medical Microbiology 115, 116, Microbiology 102, Molecular and Cell Biology 150, Neurobiology, Physiology, and Behavior 101, 126, 127, 128, 129, 140, Pathology, Microbiology, and Immunology 101, or Veterinary Medicine 158. Note that this AOS recommends additional preparatory courses; pre-requisites for admission to Veterinary Medicine vary among schools and students should confirm the specific requirements of the school(s) to which they wish to apply. Additional Preparatory (recommended, not required): Chemistry 2C, 118A, 118B, 118C, Physics 7A, 7B, 7C.

(5) Individualized: Students may, with prior approval of their adviser and the curriculum committee, design their own individualized specialization within the major. The specialization will consist of five courses with a common theme.

Total Units for the Degree 119-136

Major Adviser. D. H. Van Vuren

Students transferring to UC Davis from another institution or new students declaring the major of Wildlife, Fish, and Conservation Biology must consult the Master Adviser so that their program can be evaluated and a faculty adviser assigned. Contact the Department in 1088 Academic Surge Building or telephone (530) 752-6586.

Minor Program Requirements:

The minor in Wildlife, Fish, and Conservation Biology is for students interested in basic training and understanding of the ecology and conservation of wild terrestrial and aquatic vertebrates, emphasizing birds, mammals, and fish, but with relevance and application to all life forms.

UNITS

Wildlife, Fish, and Conservation Biology 20-32

Wildlife, Fish, and Conservation Biology 100, 151, either 154 or 155 & 155L, and choose one course from 110, 111, or 120..... 15-16

Two to four upper division elective courses chosen from the Wildlife, Fish, and Conservation Biology curriculum, excluding WFC 190, 191, 192, 195, 198, and 199..... 5-16

Minor Adviser. D. H. Van Vuren

Graduate Study. Faculty in Wildlife, Fish, and Conservation Biology are active members of several graduate programs, including the Ecology, Population Biology, Animal Behavior and Avian Science graduate groups. Students interested in graduate studies should see Graduate Studies, on page 109.

Courses in Wildlife, Fish, and Conservation Biology (WFC)

Lower Division Courses

10. Wildlife Ecology and Conservation (4)
Lecture—3 hours; discussion—1 hour. Introduction to the ecology and conservation of vertebrates. Complexity and severity of world problems in conserving biological diversity. GE credit: SciEng, Div, Wrt.—I, III. (I, III.) Elliott-Fisk, Moyle, Kelt

11. Introduction to Conservation Biology (3)
Lecture—3 hours. Introduction to conservation biology and background to the biological issues and controversies surrounding loss of species and habitats for students with no background in biological sciences. GE credit: SciEng, Wrt.—III. Caro

50. Natural History of California's Wild Vertebrates (3)
Lecture—2 hours; discussion—1 hour. Examination of the natural history of California's wild vertebrates (fish, amphibians, reptiles, birds, and mammals), including their biogeography, systematics, ecology and conservation status. GE credit: SciEng, Wrt.—II. (II.) Elliott-Fisk

92. Internship (1-6)
Internship—3-18 hours. Prerequisite: lower division standing and consent of instructor. Work experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.)

Upper Division Courses

100. Field Methods in Wildlife, Fish, and Conservation Biology (4)
Lecture—2 hours; laboratory—3 hours; fieldwork—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 and consent of instructor. Introduction to field methods for monitoring and studying wild vertebrates and their habitats, with an emphasis on ecology and conservation. Required weekend field trips.—III. (III.) Eadie, Kelt, Todd, Van Vuren

101. Field Research in Wildlife Ecology (2)
Lecture/discussion—2 hours. Prerequisite: Consent of instructor and one upper division course in each of ecology, statistics, and ornithology, mammalogy, or herpetology. Field research in ecology of wild vertebrates in terrestrial environments; formulation of testable hypotheses, study design, introduction to research methodology, oral and written presentation of results. Limited enrollment. Offered in alternate years. GE credit: Wrt.—I. Eadie, Kelt, Todd, Van Vuren

101L. Field Research in Wildlife Ecology: Laboratory (4)
Lecture/discussion—2 hours; field work—15 hours. Prerequisite: consent of instructor, course 101 (may be taken concurrently), and one upper division course in each of ecology, statistics, and ornithology, mammalogy, or herpetology. Field research in ecology of wild vertebrates in terrestrial environments; testing ecological hypotheses through field research, application of research methodology, supervised independent research projects. Held between Labor Day and fall quarter. Limited enrollment. Offered in alternate years.—I. Eadie, Kelt, Todd, Van Vuren

102. Field Studies in Fish Biology (1)
Lecture/discussion—1 hour. Prerequisite: upper division course in each of ecology, aquatic biology, fish biology, and statistics, and consent of instructor. Emphasis on theory of quantitative fish capture methods and design of individual research projects on ecology, behavior, physiology or population biology of fishes. Offered in alternate years.—III. Moyle

102L. Field Studies in Fish Biology: Laboratory (6)
Fieldwork—15 hours; laboratory—12 hours; discussion/laboratory—3 hours. Prerequisite: course 102, upper division course in each of ecology, aquatic biology, fish biology, and statistics, and consent of instructor. Field investigations of fish biology are emphasized including quantitative capture methods and individual research projects on ecology, behavior, physiology or population biology of fishes at the field site in relation to their habitats. Offered in alternate years. (Deferred grading only, pending completion of projects.) GE credit: SciEng, Wrt.—III. Moyle

110. Biology and Conservation of Wild Mammals (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or Biological Sciences 2A, 2B, 2C; Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent course. Origins, evolution, diversification, and geographical and ecological distributions of mammals. Morphological, physiological, reproductive, and behavioral adaptations of mammals to their environment.—III. (III.) Kelt

110L. Laboratory in Biology and Conservation of Wild Mammals (3)
Laboratory—6 hours. Prerequisite: course 110 (may be taken concurrently); consent of instructor. Laboratory exercises in the morphology, systematics, species identification, anatomy, and adaptations of wild mammals to different habitats. Limited enrollment.—III. (III.) Kelt

111. Biology and Conservation of Wild Birds (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or Biological Sciences 2A, 2B, 2C; Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent course. Phylogeny, distribution, migration, reproduction, population dynamics, behavior and physiological ecology of wild birds. Emphasis on adaptations to environments, species interactions, management, and conservation.—I. (I.) Eadie

111L. Laboratory in Biology and Conservation of Wild Birds (3)
Laboratory—6 hours; fieldwork—3 hours. Prerequisite: course 111 (may be taken concurrently); consent of instructor. Laboratory exercises in bird species identification, anatomy, molts, age and sex, specialized adaptations, behavior, research, with emphasis on conservation of wild birds. Several weekend field trips, after class bird walks, and independent bird study are required. Limited enrollment.—I. (I.) Eadie

120. Biology and Conservation of Fishes (3)
Lecture—3 hours. Prerequisite: Biological Sciences 2A, 2B, 2C. Evolution, ecology, and conservation of marine and freshwater fishes.—I. (I.) Moyle

120L. Laboratory in Biology and Conservation of Fishes (1)
Laboratory—3 hours. Prerequisite: course 120 (may be taken concurrently). Morphology, taxonomy, conservation, and identification of marine and freshwater fishes with emphasis on California species. Limited enrollment.—I. (I.) Moyle

121. Physiology of Fishes (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: upper division courses in nutrition and physiology or consent of instructor. Comparative physiology, growth, reproduction, behavior, and energy relations of fishes. GE credit: SciEng, Wrt.—II. (II.)

122. Population Dynamics and Estimation (4)
Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 16A-16B; Statistics 13 or the equivalent; an upper division course in ecology. Description of bird, mammal and fish population dynamics, modeling philosophy, techniques for estimation of animal abundance (e.g., mark-recapture, change-in-ratio, etc.), mathematical models of populations (e.g., Leslie matrix, logistic, dynamic pool, stock-recruitment); case histories.—III. (III.) Botsford

130. Physiological Ecology of Wildlife (4)
Lecture—4 hours. Prerequisite: course 110, 111, or 120; Neurobiology, Physiology, and Behavior 101; and Evolution and Ecology 101. Animal functions, adaptations, and ecological energetics of wildlife. Nutrition, metabolism, and productivity are emphasized as a pattern of relationships for understanding the distribution and abundance of wild ectotherms and endotherms in time and space. Not offered every year.—II. (II.) Fangue

136. Ecology of Waterfowl and Game Birds (3)
Lecture—3 hours; laboratory—3 hours; fieldwork—1 hour. Prerequisite: 111, 111L or the equivalent, or permission of instructor. Detailed examination of distribution, behavior, population dynamics, and management of waterfowl and upland game birds. Offered in alternate years.—(II.) Eadie

141. Behavioral Ecology (4)
Lecture—3 hours; film viewing—1 hour. Prerequisite: Evolution and Ecology 101. Basic theories underlying the functional and evolutionary significance of behavior, and the role of ecological constraints. Supporting empirical evidence taken mainly from studies of wild vertebrates. Offered in alternate years.—(II.) Caro

151. Wildlife Ecology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences, 1A, 1B, 1C or Biological Sciences, 2A, 2B, 2C or the equivalents; course 110L or 111L recommended. Ecology of wild vertebrates, including habitat selection, spatial organization, demography, population growth and regulation, competition, predation, and community dynamics, set in the context of human-caused degradation of environments in North America.—I. (I.) Van Vuren

152. Ecological Management of Problem Wildlife (3)
Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, and 1C, or Biological Sciences 2A, 2B, 2C, or the equivalent. Ecological approaches to managing wild vertebrates that cause problems for agriculture, public health, or conservation of biodiversity. Offered in alternate years.—II. Van Vuren

153. Wildlife Ecotoxicology (4)
Lecture—3 hours; discussion—1 hour. Prerequisite: introductory courses in organic chemistry, ecology, and physiology, or consent of instructor; Environmental Toxicology 101 recommended. Various forms of environmental pollution in relation to fish and wildlife, the effects and mechanisms of pollutants, effects on individuals and systems, laboratory and field ecotoxicology, examples/case histories, philosophical/management considerations. Offered in alternate years. GE credit: SciEng, Wrt.

154. Conservation Biology (4)
Lecture—3 hours; term paper (will be one or more book reviews). Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or the

equivalent. An introduction to conservation biology and background to the biological issues and controversies surrounding loss of species and habitats.—I. (I.) Todd

155. Habitat Conservation and Restoration (3)
Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent course; course 154 and Environmental Horticulture 160 recommended. Analysis of the characteristics of wildlife and fish habitats, the conservation of habitats, and restoration. GE credit: SciEng, Wrt.—II. (II.) Elliott-Fisk

155L. Habitat Conservation and Restoration Laboratory (2)
Fieldwork—3 hours; laboratory—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or equivalent course; course 155 (may be taken concurrently). Analysis of the characteristics of wildlife and fish habitats, application of restoration methods, and evaluation of conservation and restoration projects in the field. Students will also participate during the term in a restoration project.—II. (II.) Elliott-Fisk

156. Plant Geography (4)
Lecture—3 hours; laboratory—3 hours; term paper. Field trips will be substituted for some in-lab activities. Prerequisite: Environmental Science and Policy 100 or Evolution and Ecology 101; Plant Biology 102 or 108 strongly recommended. Survey of the geographical distribution of vegetation types and habitats, with consideration of the environmental and historical factors that determine these patterns. Conservation and management approaches. Analytical field and lab techniques introduced. Offered in alternate years. GE credit: SciEng, Wrt.—III. Elliott-Fisk

157. Coastal Ecosystems (4)
Lecture—3 hours; laboratory/fieldwork—3 hours. Prerequisite: Environmental Studies 100 or Evolution and Ecology 101; course work in organismal biology, physical geography, and geology recommended. Overview of coastal ecosystems, physical and biological elements and processes, and coastal zone dynamics, including sandy, rocky and muddy shorelines, estuaries, dunes and coastal watersheds. Discussion of the role of historical factors and conservation, restoration, and management approaches. Offered in alternate years.—(III.) Elliott-Fisk

158. Infectious Disease in Ecology and Conservation (3)
Lecture—3 hours. Prerequisite: Evolution and Ecology 101 or Environmental Science and Policy 100 or Veterinary Medicine 409 or the equivalent. Introduction to the dynamics and control of infectious disease in wildlife, including zoonotic diseases and those threatening endangered species. Basic epidemiological models and their applications. Role of scientists in developing disease control policies. Not offered every year.

190. Departmental Research Seminar (1)
Seminar—1 hour. Prerequisite: upper division standing in the biological sciences. Reports and discussions of recent advances related to wildlife and fisheries biology. May be repeated for credit up to 3 times. (P/NP grading only.)—I, II, III.

191. Museum Science (2)
Lecture—1 hour; laboratory—3 hours. Prerequisite: upper division standing and consent of instructor. Principles and methods required to preserve and present biological specimens for research, teaching collections, and museums. Not offered every year. (P/NP grading only.)—II. Engilis

192. Internship (1-12)
Internship—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work experience off and on campus in all subject areas offered in the department. Internships supervised by a member of the faculty. (P/NP grading only.)

195. Field and Laboratory Research (3)
Laboratory—6 hours; discussion—1 hour. Prerequisite: course 110L, 111L, or 120L; 121 or 130; Evolution and Ecology 101 or the equivalent; and consent of instructor. Critique and practice of research methods applied to field and/or laboratory environments of wild vertebrates. Students work independently or in small groups to design experimental protocol, analyze data, and report their findings. May be repeated two times for credit.—I, II, III. (I, II, III.)

197T. Tutoring in Wildlife and Fisheries (1-5)
Prerequisite: major in Wildlife, Fish, and Conservation Biology and consent of instructor. Experience in teaching under guidance of faculty member. (P/NP grading only.)

198. Directed Group Study (1-5)
(P/NP grading only.)

199. Special Study for Advanced Undergraduates (1-5)
(P/NP grading only.)

Graduate Courses

222. Advanced Population Dynamics (3)
Lecture—3 hours. Prerequisite: graduate standing; advanced course in ecology (e.g., Evolution and Ecology 101), population dynamics (e.g., course 122), and one year of calculus; familiarity with matrix algebra and partial differential equations recommended. Logical basis for population models, evaluation of simple ecological models, current population models with age, size, and stage structure, theoretical basis for management and exemplary case histories. Emphasis on development and use of realistic population models in ecological research. Not offered every year.—II. (II.) Botsford

223. Conservation Biology and Animal Behavior (3)
Lecture—1.5 hours; discussion—1.5 hours. Prerequisite: Ecology 208 or Animal Behavior 221. Influences of concepts of animal behavior (functional, evolutionary, developmental, mechanistic, and methodological issues) on conservation biology theory and practice. Offered in alternate years. (III.)—Caro

290. Seminar (1-3)
Seminar—1-3 hours. Prerequisite: consent of instructor. Seminar devoted to a highly specific research topic in any area of wildlife or fisheries biology. Special topic selected for a quarter will vary depending on interests of instructor and students. (S/U grading only.)—I, II, III. (I, II, III.)

290C. Research Group Conference (1)
Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress and techniques in wildlife and fishery sciences. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.)

291. Seminar in Aquatic Ecology (2)
Seminar—2 hours. Prerequisite: graduate standing in biology. Presentation and analysis of assigned topics in aquatic ecology emphasizing fish, fisheries and aquatic conservation. Offered in alternate years. (S/U grading only.)—III. (III.) Moyle

292. Physiology of Fishes Seminar (1)
Seminar—1 hour. Prerequisite: graduate standing and at least two courses in physiology; consent of instructor. Seminar devoted to current topics concerning the physiological functioning of fishes. May be repeated two times for credit. Not offered every year. (S/U grading only.)—I. (I.)

294. Behavioral Ecology of Predators and Prey (3)
Seminar—2 hours. Prerequisite: graduate standing. Presentation and analysis of research papers on social and foraging behavior of predatory animals, antipredator strategies of prey species, co-evolution of predators and prey, and ecology of predator prey interactions. May be repeated two times for credit. (Same course as Animal Behavior 294.) Offered in alternate years.—II. Caro

295. Seminar in Wildlife Ecotoxicology (3)
Seminar—2 hours; term paper. Prerequisite: graduate standing in biology. Presentation and analysis of assigned and searched research papers on transport, exposure, and effects of environmental contaminants on wildlife-associated ecosystem components, especially at individual/population levels. Specific subjects vary each offering. Offered in alternate years. (S/U grading only.)

297T. Supervised Teaching in Wildlife and Fisheries Biology (1–3)
Tutorial—3–9 hours. Prerequisite: meet qualifications for teaching assistant; graduate standing; and consent of instructor. Tutoring and teaching students in undergraduate courses in Wildlife, Fish, and Conservation Biology. Weekly conferences with instructor; evaluations of teaching; preparing for and conducting demonstrations, laboratories, and discussions; preparing and grading examinations. May be repeated for a total of 6 units when a different course is tutored. (S/U grading only.)

298. Group Study (1-5)

299. Research (1-12)
(S/U grading only.)

Students transferring to UC Davis from another institution or new students declaring the major of Wildlife, Fish, and Conservation Biology must consult the Master Adviser so that their program can be evaluated and a faculty adviser assigned. Contact the Department in 1088 Academic Surge Building or telephone (530) 752-6586.

Wine Production

Food Science and Technology, on page 305; Microbiology, on page 411; and Viticulture and Enology, on page 530.

Women and Gender Studies

(College of Letters and Science)

Amina Mama, Ph.D., Program Director

Program Office. 2222 Hart Hall
(530) 752-4686;
http://wms.ucdavis.edu/wgssite/

Committee in Charge

Elizabeth Constable, Ph.D.
(Women and Gender Studies)
Maxine Craig, Ph.D. *(Women and Gender Studies)*
Wendy Ho, Ph.D.
(Asian American Studies, Women and Gender Studies)
Suad Joseph, Ph.D.
(Anthropology, Women and Gender Studies)
Susan Kaiser, Ph.D. *(Textiles and Clothing, Women and Gender Studies)*
Caren Kaplan, Ph.D.
(Women and Gender Studies, Cultural Studies)
Anna K. Kuhn, Ph.D. *(Women and Gender Studies)*
Amina Mama, Ph.D *(Women and Gender Studies)*
Luz Mena, Ph.D. *(Women and Gender Studies)*
Kimberly D. Nettles-Barcelón, Ph.D.
(Women and Gender Studies)
Margaret Swain, Ph.D. *(Center for Gender and Global Issues, Women and Gender Studies)*

Faculty

Elizabeth Constable, Ph.D., Associate Professor
(Women and Gender Studies)
Maxine Craig, Ph.D., Associate Professor
(Women and Gender Studies)
Wendy Ho, Ph.D., Associate Professor *(Asian American Studies, Women and Gender Studies)*
Suad Joseph, Ph.D., Professor
(Anthropology, Women and Gender Studies)
Susan B. Kaiser, Ph.D., Professor *(Textiles and Clothing; Women and Gender Studies)*

Caren Kaplan, Ph.D., Professor *(Women and Gender Studies, Cultural Studies)*
Anna K. Kuhn, Ph.D., Professor *(Women and Gender Studies)*
Amina Mama, Ph.D., Professor *(Women and Gender Studies)*
Luz Mena, Ph.D., Assistant Professor *(Women and Gender Studies)*
Kimberly D. Nettles-Barcelón, Ph.D., Associate Professor *(Women and Gender Studies)*

Emeriti Faculty

Judith Newton, Ph.D., Professor Emerita
Leslie Rabine, Ph.D., Professor Emerita

The Major Program

Women's Studies is an interdisciplinary major founded on the feminist theoretical premise that gender is a historically variable construction that centrally shapes the historical experience and everyday lives of women as well as men. Women's Studies also assumes that gender, race, class, sexual and national identities are constructed in relation to one another. The intersections of these categories of experience as well as the history of debate over what these categories mean is an important strand of the Women's Studies curriculum. Women's Studies at UC Davis is particularly rich in faculty doing comparative, cross-cultural work on women and gender. Among the faculty offering courses for the major are scholars working on women and gender in various countries across Africa, the Americas, Asia, the Caribbean, Europe, and the Middle East,.

The Program. Perhaps the most exciting aspect of the Women's Studies major is that students can pursue their particular academic interests and design their course of study accordingly. In devising their program of study, students will draw on courses offered in African American and African Studies, American Studies, Anthropology, Asian American Studies, Chicana/o Studies, Comparative Literature, English, French, German and Italian Studies, History, Linguistics, Native American Studies, Political Science, Psychology, Sociology, Spanish, Textiles and Clothing, and other related disciplines.

In addition to offering a broad array of courses that deal with gender, class, race, ethnicity, and sexuality, the Women and Gender Studies Program affords interested students the opportunity to earn internship credit and conduct independent research as well as take advantage of the Honors Thesis option.

Students design a program of study in consultation with an adviser that is in accordance with their individual career goals. Many Women's Studies majors find it advantageous to pursue a double major, or to minor in another field of study.

Career Alternatives. A degree in Women's Studies opens many possibilities for future employment. The major introduces students to relevant social issues, fosters critical thinking, and encourages social advocacy; it also hones their verbal and writing skills. It prepares students for entrance into graduate programs in the Humanities or Social Sciences.

Pre-professional students will discover that a major in Women's Studies offers useful preparatory training for medical or law school. It is particularly suitable for those interested in specializing in social or family-related issues. Students who plan to do practical work in counseling, clinical psychology, social services, or political science will also find Women's Studies to be a helpful undergraduate major. Those who wish to do graduate level research in such fields as anthropology, comparative literature, cultural studies, education, ethnic studies, film studies, history, languages and literatures, performance studies, philosophy, political science, and sociology will also benefit from a strong undergraduate background in women's history, feminist social theory, and a feminist understanding of narrative and cultural representation.

Increasingly, corporations, colleges and universities, insurance companies, and personnel firms are hiring specialists in women and gender studies as consultants. Current state and federal agencies need people who have special understanding for the problems that women face in society, industry, and the professions. Educational institutions need specialists to develop and administer women and gender studies programs, women's centers, and other organizations designed specifically to study and assist women.

Women's Studies

A.B. Major Requirements:

UNITS

Preparatory Subject Matter 20

Two courses from Women's Studies 20, 50, 60, 70..... 8
Three courses selected from the following: African American and African Studies 10, 15, American Studies 1E, 1F, Anthropology 2, 20, 21, Art History 15, Asian American Studies 1, 2, Chicana/o Studies 10, 50, Classics 15, Comparative Literature 12, Dramatic Art 1, English 30A or 30B, 45, 46A or 46B or 46C, History 72A, 72B, Humanities 10, Native American Studies 1, 10, Nature and Culture 1, Political Science 7, Psychology 1, Science and Society 1, 15, Sociology 1, 2, 3, Textiles and Clothing 7, Women's Studies 80..... 12

Depth Subject Matter 44

Women's Studies 103, 104, 190 and one additional upper division Women's Studies course 16
Cross-Cultural Requirement..... 16
Choose four courses (at least one from each category). Courses used to meet this requirement may not duplicate those used to meet other Women's Studies major requirements. The list that follows represents a partial list of options; other courses may be included with the consent of the Women's Studies Adviser.
Ethnic Studies: Women of Color in the United States: African American and African Studies 123, 133, Anthropology 139, Asian American Studies 112, Chicana/o Studies 111, 122, 131, Native American Studies 134, 180, Sociology 134, 172, Women's Studies 160, 180.
Cultures Outside the United States: Anthropology 130A, Comparative Literature 135, 138, 159, English 185A, 185B, German 129, History 102G, 102H, 148A, 148B, Women's Studies 102, 182, 184.
Historical Material Prior to 1900: African American and African Studies 123, Asian American Studies 112, English 185A, History 148A, 148B, Italian 141, Native American Studies 180.
Gender-based courses 12
Choose one of two tracks: Disciplinary or Thematic. Courses used to meet this requirement may not duplicate those used to meet other Women's Studies major requirements.

Disciplinary track

Choose three courses from one of the following focus groups:
Anthropology focus: Anthropology 129, 130, 131, 134, 139, 148B, 158, Women's Studies 102, 182, 184.
History focus: African American and African Studies 123, Asian American Studies 112, English 185A, History 102H, 102G, 110C, 116, 132, 148A, 148B, 159, 173, 176B, 177B, 184, 193A, Italian 141, Native American Studies 180.
Literature and Language focus: Comparative Literature 135, 138, 159, English 185A, 185B, French 133, German129, Italian 141, Linguistics 163, Russian 142, Women's Studies 129.
Sociology and Psychology focus: Anthropology 129, Chicana/o Studies 122, Psychology 149, Sociology 131, 132, 134, 145B, 172, Women's Studies 187.

Thematic track

In consultation with a Women's Studies adviser, choose three courses that form a thematic cluster (for example, Gender and Race in the United States; The Cultural Representations of Gender; Gender and Public Policy; Gender and Global Issues; Gender and Autobiography; The Body, Theory and Representation; Sexualities; Gender and Science). Other clusters may be developed in consultation with a Women's Studies adviser.

Total units for the major 64

Major Adviser. All Women's Studies majors and minors must consult with a faculty adviser, individually, at least once each academic year.

Minor Program Requirements:

UNITS

Women's Studies 24

Women's Studies 20, 50, 60, 70 or 80 ... 4
Choose one from African American and African Studies 123, 133, Anthropology 139, Asian American Studies 112, Chicana/o Studies, 111, 122, 131, Native American Studies 134, 180, Sociology 134, 172, Women's Studies 160, 180 4
Choose one from Anthropology 148B, Comparative Literature 135, 138, 159, English 185A, 185B, 129, History 102G, 102H, 148A, 148B, Women's Studies 102, 182, 184 4
Additional Electives from approved list of upper division cross-listed and Women's Studies courses..... 12
Note: With prior consultation with an adviser, other upper division courses may be accepted toward the minor program. Under no circumstances may more than one lower division course be offered in satisfaction of requirements for the minor.

Minor Adviser. All Women's Studies majors and minors must consult with a faculty adviser, individually, at least once each academic year.

Graduate Study. The Women and Gender Studies Program offers a designated emphasis in Feminist Theory and Research for students enrolled in the Ph.D. programs of twelve other affiliated departments.

Courses in Women's Studies (WMS)

Lower Division Courses

20. Cultural Representations of Gender (4)

Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Interdisciplinary investigation of how specific cultures represent gender difference. Examine a variety of cultural forms and phenomena including film, television, literature, music, popular movements, and institutions. GE credit: ArtHum, Div, Wrt.—III. (III.) Craig

25. Gender and Global Cinema (4)

Lecture—3 hours; film viewing—3 hours. The role gender plays in film history/culture in various geographical contexts and in aspects of contemporary globalization. Films from nations such as China, Colombia, Cuba, Ethiopia, India, Iran, Korea, New Zealand, and the U.S. GE credit: ArtHum, Div, Wrt.—II. (II.) Constable, Kuhn

50. Introduction to Women and Gender Studies (4)

Lecture—3 hours; discussion—1 hour. Interdisciplinary introduction surveys and integrates anthropological, artistic, cultural studies, historical, legal, literary, philosophical, psychological, scientific, and sociological perspectives on the study of gender and its relationship to race, sexuality, class, and other aspects of social experience. GE credit: ArtHum or SocSci, Div, Wrt.—I, II, III. Ho, Kaplan, Kuhn, Mena, Nettles-Barcelón

60. Introduction to Feminist Interpretations of Western Thought (4)
Lecture/discussion—4 hours. A critical introduction to major traditions of social thinking in the West from a feminist perspective. Not offered every year. GE credit: ArtHum or SocSci, Div, Wrt.—Craig

70. Theory and History of Sexualities (4)
Lecture/discussion—4 hours. Key issues in the social construction, organization, and reproduction of sexualities such as the intersection of sexual identity with gender, race, ethnicity, and class, and the relation between movements for sexual liberation and the regulation of the body. GE credit: ArtHum or SocSci, Div.—(I.)

80. Special Topics in Women's Studies (4)
Lecture/discussion—4 hours. In-depth examination of a women's studies topic related to the research interest of the instructor. May be repeated for credit when topic differs. Limited enrollment.—Constable, Ho, Joseph, Kaiser, Kuhn, Mena, Nettles-Barcelón, Swain

90X. Lower Division Seminar (2)
Seminar—2 hours. Examination of a special topic in Women's Studies through shared readings, discussions, and written assignments. Offered in alternate years.—Constable, Joseph, Kaiser, Kaplan, Kuhn, Mena, Nettles-Barcelón, Swain

91. Research Seminar in the Transnational Production and Consumption of Fashion (1-2)
Seminar—1-2 hours. Preparation for a research conference. May be repeated for credit when topic varies.—II. (II.) Kaiser

98. Directed Group Study (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)—Constable Ho, Joseph, Kaiser, Kaplan, Kuhn, Mena, Nettles-Barcelón, Swain

99. Special Study for Undergraduates (1-5)
Prerequisite: consent of instructor. (P/NP grading only.)—Constable, Craig, Ho, Joseph, Kaiser, Kaplan, Kuhn, Mena, Nettles-Barcelón, Swain

Upper Division Courses

102. Colonialism, Nationalism, and Women (4)
Lecture/discussion—4 hours. Prerequisite: one course specified for Women's Studies major. Explores key dimensions of women's relationship to colonialism and nationalism in one or more societies. GE credit: SocSci, Div.—I. Mena, Swain

103. Introduction to Feminist Theory (4)
Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Introduction to the emergence of feminist theory and to key concepts in feminist theorizing. Examination of past and current debates over sexuality, race, identity politics, and the social construction of women's experience.—I. (I.) Constable, Craig, Kuhn, Mena, Nettles-Barcelón

104. Feminist Approaches to Inquiry (4)
Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. Feminist applications and transformations of traditional disciplinary practices; current issues and methodologies in feminist interdisciplinary work.—II. (II.) Constable, Mena, Nettles-Barcelón

130. Feminism and the Politics of Family Change (4)
Lecture/discussion—4 hours. Prerequisite: any Women's Studies course or Sociology 131 or 132. An examination of contemporary conflicts over family values and the changing family from a feminist perspective. Offered in alternate years. GE credit: ArtHum or SocSci, Div.—(II.) Joseph

136. Topics in Gender, Production, Consumption and Meaning (4)
Lecture/discussion—3 hours; term paper Construction of gender through production and consumption of goods and services. Transnational movement of peoples and products. Topics may include fashion, film, food, and technology. May be repeated for credit. GE Credit: ArtHum or SocSci, Div, Wrt.—Constable, Ho, Kaiser, Nettles-Barcelón

137. Feminist Interpretations of Contemporary Western Thought (4)
Lecture/discussion—4 hours. Prerequisite: one course in Women's Studies, or consent of instructor. Introduction to deciphering, demystifying, and interpreting poststructuralist, postmodern, and postcolonial thought from a feminist perspective: applications to gender, race, sexuality, and class. Not offered every year. GE credit: ArtHum or SocSci, Div, Wrt.

138. Transnational Studies of Dress, Fashion, and Gender (4)
Lecture/discussion—4 hours. Prerequisite: one course in Women's Studies or Textiles and Clothing 7, 107, or 174. Dress and fashion as cultural communication, aesthetic expression, capitalist commodity. History, sociology, semiotics of fashion. Fashion as means of gender oppression and liberation. Use of dress in identity construction across cultures. Clothing workers on the global assembly line. Not offered every year. GE credit: ArtHum or SocSci, Div, Wrt.—Kaiser

139. Feminist Cultural Studies (4)
Lecture/discussion—4 hours. Prerequisite: one course in Women's Studies or American Studies. The histories, theories, and practices of feminist traditions within Cultural Studies. (Same as course American Studies 139.) GE credit: SocSci, Div, Wrt.—(II.) Kaiser

140. Gender and Law (4)
Lecture/discussion—4 hours. Prerequisite: one course in Women's Studies. Exploration of women's legal rights in historical and contemporary context, discussing a variety of legal issues and applicable feminist theories. Topics include constitutional equal protection, discrimination in employment and education, sexual orientation discrimination, and the regulation of abortion. GE credit: SocSci, Div.—(III.) West

158. Contemporary Masculinities (4)
Lecture/discussion—4 hours. Prerequisite: one course specified for the Women's Studies major. A multicultural study of contemporary trends in masculinity and the economic, social and political forces that have shaped them. Topics may include men's movements, ethnic nationalist masculinities, and images of masculinity in popular culture. GE credit: ArtHum or SocSci, Div.—III. Craig, Ho

160. Representations of Women of Color in Cinema (4)
Lecture/discussion—3 hours; film viewing—3 hours. Prerequisite: course 20 or another film course. The representations of women of color in commercial and independent films from a feminist perspective. GE credit: ArtHum, Div.—(III.) Mama

162. Feminist Film Theory and Criticism (4)
Lecture/discussion—3 hours; film-viewing—3 hours. Prerequisite: one course from the Women's Studies major and Humanities 10 or consent of instructor. Historical overview of and contemporary issues in feminist film theory, including representation, spectatorship, and cultural production. Film stars, women filmmakers, and the intersections of gender, race, sexuality, and class in films and their audiences. Offered in alternate years. GE credit: ArtHum, Div.—III. Constable

164. Topics in Gender and Cinematic Representation (4)
Lecture/discussion—3 hours; film-viewing—3 hours. Prerequisite: one course from the Women's Studies major and Humanities 10 or consent of instructor. Examination of a specific topic within the broad rubric of gender and cinema. Possible topics include Latinas in Hollywood; gender, nation, cinema; and gender and film genre. Topics vary. May be repeated two times for credit when topic differs. Offered in alternate years. GE credit: ArtHum, Div.—Constable, Kuhn

165. Feminist Media Production (6)
Lecture/discussion—3 hours; laboratory—3 hours; fieldwork—6 hours. Prerequisite: one course in Women and Gender Studies or consent of instructor. Basic media production and community service. Video, audio and photography instruction; feminist community documentary; video ethnography; video journals; alternative representations of fashion and women's bodies. Fundamentals of camera and microphone operation, interviewing techniques, and editing. May be repeated two times for credit if topic differs. Not offered every year. GE credit: ArtHum or SocSci, Div.

170. Queer Studies (4)
Lecture/discussion—4 hours. Prerequisite: course 20, or 50, or 70, or consent of instructor. Study of queer sexualities, identities, theories, practices. Alternative sexualities as historical, social, and cultural constructions in intersections with race, gender, class, nationality. Interdisciplinary exploration of sexual liberation and the regulation of sexuality through history, theory and expressive cultural forms. GE credit: ArtHum or SocSci, Div, Wrt. Not offered every year.

178A-F. Transnationalism and Writing by Women of Color (4)
Lecture/discussion—4 hours. Prerequisite: one course in Women's Studies, or consent of instructor. Writings by women of color in a transnational framework, understood in their cultural, socio-economic, and historical contexts. The interrelation among gender, writing, nationalism, and transnationalism, with focus on women's writing in specific geographic/national locations and their diasporas: (A) The Arab World; (B) Asia; (C) The Caribbean; (D) Africa; (E) Diasporic Women Writers in Europe; (F) Topics on Women Writers of Color. Not offered every year. GE credit: ArtHum, Div, Wrt.—Constable, Ho, Joseph, Kuhn, Mena, Nettles-Barcelón

179. Gender and Literature (4)
Lecture/discussion—4 hours. Prerequisite: one course in Women's Studies, or consent of instructor. Role of literature, especially novels, in constructing, challenging, and transforming normative genders in society. Transhistorical and transnational focus on gender in its intersections with race, class, sexuality, and politics. Not offered every year. GE credit: ArtHum, Div, Wrt.—Constable, Ho, Kuhn

180. Women of Color Writing in the United States (4)
Lecture/discussion—4 hours. Prerequisite: course 20 or 50. Literature, especially novels, written by contemporary women of color in the United States, understood in their socio-economic, cultural and historical contexts. GE credit: ArtHum, Div.—II. Ho, Nettles-Barcelón, Kuhn

182. Globalization, Gender and Identity (4)
Lecture/discussion—4 hours. Prerequisite: course 50. Feminist theories on affects of gender on self and identity and cross cultural study as it intersects gender with race, class, ethnicity. Impact of globalization processes on gender and identity. Offered in alternate years. GE credit: SocSci, Div, Wrt.—III. Mama, Mena, Swain

184. Gender in the Arab World (4)
Lecture/discussion—4 hours. Prerequisite: course 50. Examination of the history, culture, and social/political/economic dynamics of gender relations and gendering in the Arab world. GE credit: SocSci, Div, Wrt.—II. Joseph

185. Women and Islamic Discourses (4)
Lecture/discussion—4 hours. Prerequisite: course 50 or comparable course. Introduction to the debates/discourses about women and Islam. Transformations in debates/discourses in colonial and postcolonial periods in the Middle East & South Asia. Comparative study of debates/discourses on family, work, law, sexuality, religion, comportment, human rights, feminist and religious movements. Not offered every year. (Same course as Middle East/South Asia Studies 150.)—Joseph

187. Gender and Social Policy (4)
Lecture/discussion—3 hours; term paper. Prerequisite: upper division standing and a course in Women's Studies. The role of gender in the creation of social policies, especially with respect to issues brought into the policy arena by contemporary feminism. Offered in alternate years. GE credit: SocSci, Div.—(III.) Craig, Nettles-Barcelón

189. Special Topics in Women and Gender Studies (4)
Lecture/discussion—4 hours. Prerequisite: one course from the Women's Studies major. In-depth examination of a women's studies topic related to the research interests of the instructor. May be repeated one time for credit when topic differs. Not offered every year.—I. Constable, Craig, Ho, Joseph, Kaiser, Kuhn, Mama, Mena, Nettles-Barcelón, Swain

190. Senior Seminar (4)
Seminar—4 hours. Prerequisite: senior standing in Women's Studies. Capstone course for senior Women's Studies majors, which focuses on current issues on feminism as they impact theory, public policy, and practice.—III. (III.) Constable, Craig, Ho, Joseph, Kaiser, Kuhn, Mama, Mena, Nettles-Barcelón, Swain

191. Capstone Seminar (4)
Seminar—4 hours. Prerequisite: course 104 or Textiles and clothing 107, and course 194HA, course 199, or Textiles and Clothing 199, or consent of instructor. Revision, completion, and presentation of senior research or creative project. Creating a multimedia Web site for publishing research and creative projects. GE credit: Wrt.—III. (III.) Kaiser

192. Internship in Women's Studies (1-12)
Internship—3-36 hours; written report. Prerequisite: completion of a minimum of 84 units and consent of instructor; enrollment dependent on availability of intern positions with priority to Women's Studies majors. Supervised internship and study in positions/institutional settings dealing with gender-related problems or issues, as for example, a women's center, affirmative action office, advertising agency, or social welfare agency. Final written report on internship experience. (P/NP grading only.)—Constable, Craig, Ho, Joseph, Kaiser, Kaplan, Kuhn, Mena, Nettles-Barcelón, Swain

193. Gender and Global Issues Internship Seminar (2)
Seminar—2 hours. Prerequisite: course 192 concurrently. The ethics of working in communities and community projects, emphasizing feminist understandings of activism, communities, globalization, multiculturalism, and the politics of institutions, agencies, and organizations. May be repeated for credit. (P/NP grading only.)—I, II, III. (I, II, III.) Swain

194HA-194HB. Senior Honors Project in Women's Studies (4-6)
Independent study—12 hours. Prerequisite: senior standing, Women's Studies major, and adviser's approval. In consultation with an adviser, students complete a substantial research paper or significant creative project on a Women's Studies topic. (Deferred grading only, pending completion of sequence.)—Constable, Craig, Ho, Joseph, Kaiser, Kaplan, Kuhn, Mama, Mena, Nettles-Barcelón, Swain

195. Thematic Seminar in Women's Studies (4)
Seminar—4 hours. Prerequisite: two courses specified for women's studies major. Group study of a topic, issue or area in feminist theory and research involving intensive reading and writing. May be repeated for credit when topic differs. Limited enrollment. GE credit: ArtHum or SocSci, Div.—III. Constable, Ho, Joseph, Kaiser, Kuhn, Mama, Mena, Nettles-Barcelón, Swain

197T. Tutoring in Women's Studies (1-4)
Tutoring—3-12 hours. Prerequisite: upper division standing and consent of director. Leading small, voluntary discussion groups affiliated with a Women's Studies course. May be repeated for credit for a total of 8 units. (P/NP grading only.)

198. Directed Group Study (1-5)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)—Constable, Joseph, Kaiser, Kaplan, Kuhn, Mena, Nettles-Barcelón, Swain

199. Special Study for Advanced Undergraduates (1-5)
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)—Constable, Joseph, Kaiser, Kaplan, Kuhn, Mena, Nettles-Barcelón, Swain

Graduate Courses

200A. Current Issues in Feminist Theory (4)
Seminar—4 hours. Current issues in feminist theory; techniques employed to build feminist theory in various fields.—I. (I.) Constable, Craig, Ho, Joseph, Kaiser, Kuhn, Mama, Mena, Nettles-Barcelón, Swain

200B. Problems in Feminist Research (4)
Seminar—4 hours. Prerequisite: course 200A with a grade of B+ or better. Application of feminist theoretical perspectives to the interdisciplinary investigation of a problem or question chosen by the instructor(s). May be repeated for credit when subject area differs.—II. (II.) Constable, Craig, Mama, Mena, Nettles-Barcelón

201. Special Topics in Feminist Theory and Research (4)
Lecture/discussion—4 hours. Explores in depth a topic in feminist theory and research related to the research interests of the instructor. May be repeated for credit when topic differs. Limited enrollment.—(III.) Constable, Craig, Ho, Joseph, Kaiser, Kuhn, Mama, Mena, Nettles-Barcelón, Swain

250. Cultural Study of Masculinities (4)
Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Interdisciplinary approaches to understanding the social and cultural construction of masculinities; attention to the effects of biology, gender, race, class, sexual and national identities; criticism of oral, printed, visual, and mass mediated texts, and of social relations and structures. (Same course as American Studies 250.)—Craig, Ho

299. Special Study for Graduate Students (1-12)
(S/U grading only.)—Constable, Craig, Ho, Joseph, Kaiser, Kaplan, Kuhn, Mena, Nettles-Barcelón, Swain

299D. Dissertation Research and Writing (4)
Prerequisite: courses 200A and 200B; fulfillment of course requirements for the DE in Feminist Theory and Research, advancement to candidacy. (S/U grading only.)—Constable, Ho, Joseph, Kaiser, Kaplan, Kuhn, Mena, Nettles-Barcelón, Swain

Professional Course

396. Teaching Assistant Training Practicum (1-4)
Prerequisite: graduate standing. May be repeated for credit. (S/U grading only.)—I, II, III. (I, II, III.) Constable, Craig, Ho, Joseph, Kaiser, Kuhn, Mama, Mena, Nettles-Barcelón, Swain

Zoology

See Evolution and Ecology, on page 297.

GENERAL EDUCATION OPTIONS/COURSES

TOPICAL BREADTH ASSIGNED SUBJECT AREAS FOR MAJORS AND MINORS

ARTS & HUMANITIES

Majors

African American and African Studies
American Studies
Art History
Art Studio
Asian American Studies (Humanities emphasis)
Chicana/Chicano Studies (Cultural emphasis)
Chinese
Classical Civilization
Comparative Literature
Design
Dramatic Art
English
Film Studies
French
German
History
Italian
Japanese
Medieval and Early Modern Studies
Music
Native American Studies
Philosophy
Religious Studies
Russian
Spanish
Technocultural Studies
Women's Studies

Minors

African American and African Studies
American Studies
Art History
Art Studio
Asian American Studies
Chicana/Chicano Studies
Chinese
Classical Civilization
Comparative Literature
Dramatic Art
English
Expository Writing
Film Studies
French
German
Global and International Studies (Arts and Humanities Emphasis)
Greek
History
Italian
Japanese
Jewish Studies
Landscape Restoration
Latin
Luso-Brazilian Studies
Medieval and Early Modern Studies
Music
Native American Studies
Philosophy
Religious Studies
Russian
Sexuality Studies
Social and Ethnic Relations
Spanish
Women's Studies

SCIENCE & ENGINEERING

Majors

Agricultural & Environmental Education
Animal Biology
Animal Science
Animal Science & Management
Anthropology (B.S.degree only)
Applied Mathematics
Applied Physics
Atmospheric Science
Avian Sciences
Biochemistry and Molecular Biology
Biological Sciences
Biotechnology
Cell Biology
Chemistry
Clinical Nutrition
Computer Science
Ecological Management and Restoration
Engineering (all majors)
Entomology
Environ Hort & Urban Forestry
Environmental Science & Management
Environmental Toxicology
Evolution, Ecology & Biodiversity
Exercise Biology
Fiber and Polymer Science
Food Science
Genetics
Geology
Hydrology
Mathematical and Scientific Computation
Mathematics
Microbiology
Natural Sciences
Neurobiology, Physiology, and Behavior
Nutrition Science
Physics
Plant Biology
Plant Sciences
Psychology (B.S. degree)
Statistics
Technology Management
Viticulture & Enology
Wildlife, Fish, & Conservation Biology

Minors

Agri Computing & Info Systems
Agricultural Pest Management
Agricultural Systems & Environment
Animal Science—Animal Biology
Animal Science—Animal Genetics
Animal Science—Aquaculture
Animal Science—Dairy/Livestock
Animal Science—Equine
Anthropology (Evolutionary emphasis)
Apiculture
Applied Computing & Info Systems
Atmospheric Science
Avian Sciences
Biological Sciences
Chemistry
Community Nutrition
Computational Applied Science
Computer Science
Construction Engineering and Management
Engineering (all majors)
Environmental Geology
Environmental Horticulture
Environmental Toxicology
Exercise Biology
Fiber and Polymer Science
Forensic Entomology
Fungal Biology & Ecology
Geographic Information Systems
Geographic Studies
Geology
Geophysics
Hydrologic Science
Hydrology
Insect Biology
Insect Ecology & Evolution
International Science Studies
Landscape Restoration
Mathematics
Medical-Veterinary Entomology
Nematology
Nutrition Science
Nutrition and Food
Oceanography
Physics
Plant Biology
Precision Agriculture
Quantitative Biology and Bioinformatics
Science and Society
Soil Science
Statistics
Watershed Science
Wildlife, Fish, and Conservation Biology

SOCIAL SCIENCES

Majors

Anthropology (A.B. degree)
Asian American Studies (Social Science emphasis)
Chicana/Chicano Studies (Social/Policy Studies emphasis)
Communication
Community and Regional Develop
East Asian Studies
Economics
Environmental Policy Analysis & Planning
Human Development
International Agricultural Development
International Relations
Linguistics
Managerial Economics
Middle East/South Asia Studies
Political Science
Political Science—Public Service
Psychology (A.B. degree)
Science & Tech Studies
Sociology
Sociology—Organizational Studies
Textiles & Clothing

Minors

Aging and Adult Development
Anthropology (General emphasis)
Anthropology (Sociocultural emphasis)
Communication
Community Development
Contemporary Leadership
East Asian Studies
Economics
Education
Energy Policy
Environmental Policy Analysis
Global and International Studies (Social Science emphasis)
History & Philosophy of Science
Human Development
International Agricultural Development Latin American and Hemispheric Studies
Linguistics
Linguistics for Language Teachers
Managerial Economics
Middle East/South Asia Studies
Political Science
Psychology
Science and Society
Sociology
Technology Management
Textiles & Clothing
War-Peace Studies

GENERAL EDUCATION COURSES
TOPICAL BREADTH

These courses provide GE credit for topical breadth. Many of these courses also satisfy the GE requirement for social-cultural diversity (indicated by **D**) and/or provide GE credit for writing experience (indicated by **W**). Complete lists of the courses that satisfy the social-cultural diversity requirement and the courses that provide writing experience credit follow this list.

Arts & Humanities

Afr Am & Afr Std 12	D	W
Afr Am & Afr Std 15	D	W
Afr Am & Afr Std 16	D	W
Afr Am & Afr Std 50	D	W
Afr Am & Afr Std 52	D	W
Afr Am & Afr Std 100	D	
Afr Am & Afr Std 107A	D	W
Afr Am & Afr Std 107B	D	W
Afr Am & Afr Std 107C	D	W
Afr Am & Afr Std 111	D	W
Afr Am & Afr Std 123	D	
Afr Am & Afr Std 150A	D	
Afr Am & Afr Std 150B	D	
Afr Am & Afr Std 152	D	W
Afr Am & Afr Std 160	D	
Afr Am & Afr Std 162	D	W
Afr Am & Afr Std 163	D	W
Afr Am & Afr Std 168	D	
Afr Am & Afr Std 169	D	
Afr Am & Afr Std 170	D	W
Afr Am & Afr Std 171	D	
Afr Am & Afr Std 175A	D	W
Afr Am & Afr Std 180 †	D	
Afr Am & Afr Std 181	D	
Afr Am & Afr Std 185	D	W
American Studies 1A	D	W
American Studies 1B †	D	W
American Studies 1C †	D	W
American Studies 1E †	D	W
American Studies 5 †		W
American Studies 10 †	D	W
American Studies 21	D	W
American Studies 25 †	D	W
American Studies 30 †	D	W
American Studies 55 †	D	W
American Studies 59 †	D	W
American Studies 110 †	D	W
American Studies 120 †	D	W
American Studies 130 †	D	W
American Studies 151 †	D	W
American Studies 152 †	D	W
American Studies 153 †	D	W
American Studies 154 †	D	W
American Studies 155 †	D	W
American Studies 156 †	D	W
American Studies 157 †	D	W
American Studies 158		
Anthropology 145 †	D	W
Art History 1A		
Art History 1B		
Art History 1C	D	
Art History 1D	D	
Art History 1DV	D	
Art History 1E	D	
Art History 5	D	W
Art History 10		
Art History 25		#
Art History 100		W
Art History 110		W
Art History 150	D	
Art History 151	D	
Art History 152	D	
Art History 153	D	W
Art History 155	D	W
Art History 156	D	W
Art History 163A	D	W
Art History 163B	D	W
Art History 163C	D	W
Art History 163D	D	W
Art History 164	D	W
Art History 168		W
Art History 172A		W
Art History 172B		W
Art History 173		W
Art History 175	D	W
Art History 176A		W
Art History 176B		W
Art History 177A		W
Art History 177B		W
Art History 178A		W
Art History 178B		W
Art History 178C		W
Art History 179B		W
Art History 182		W
Art History 183A		
Art History 183B	D	W
Art History 183C	D	W
Art History 184		W
Art History 185	D	W
Art History 186	D	W
Art History 187	D	W
Art History 188A	D	W
Art History 188B		W
Art History 188D		W
Art History 188E		W
Art History 189	D	W
Art Studio 10		
Art Studio 24		
Art Studio 26		W
Art Studio 30	D	W
Art Studio 147		W
Art Studio 148		W
Art Studio 149	D	W
Art Studio 150		W
Asian American Studies 4	D	W
Asian American Studies 112 †	D	
Asian American Studies 130	D	
Asian American Studies 141 †	D	
Chicano Studies 60	D	
Chicano Studies 65	D	
Chicano Studies 111		
Chicano Studies 150	D	W
Chicano Studies 154	D	
Chicano Studies 160	D	
Chicano Studies 181	D	W
Chicano Studies 182 †	D	W
Chinese 10	D	W
Chinese 11	D	W
Chinese 50	D	W
Chinese 100A	D	W
Chinese 101	D	
Chinese 102	D	W
Chinese 103	D	W
Chinese 104	D	W
Chinese 105	D	W
Chinese 106	D	W
Chinese 107	D	W
Chinese 108	D	W
Chinese 109A	D	W
Chinese 109C	D	W
Chinese 109D	D	W
Chinese 109E	D	W
Chinese 109G	D	W
Chinese 109H	D	W
Chinese 109I	D	W
Chinese 110	D	W
Classics 1		W
Classics 2		W
Classics 3		
Classics 10		
Classics 15	D	W
Classics 20		W
Classics 50		W
Classics 102		W
Classics 110		W
Classics 140		W
Classics 141		W
Classics 142		W
Classics 143		W
Classics 150		W
Classics 171	D	W
Classics 172A		W
Classics 172B		W
Classics 173		W
Classics 174		W
Classics 175	D	W
Classics 190		W
Comparative Literature 1		W
Comparative Literature 2		W
Comparative Literature 3		W
Comparative Literature 4	D	*
Comparative Literature 5	D	W
Comparative Literature 6	D	W
Comparative Literature 7	D	W
Comparative Literature 8		W
Comparative Literature 9	D	W
Comparative Literature 12	D	W
Comparative Literature 13		W
Comparative Literature 14		W
Comparative Literature 20		W
Comparative Literature 25	D	W
Comparative Literature 53A	D	W
Comparative Literature 53B	D	W
Comparative Literature 53C	D	W
Comparative Literature 100	D	W
Comparative Literature 110	D	W
Comparative Literature 120		W
Comparative Literature 135	D	W
Comparative Literature 138	D	W
Comparative Literature 140		W
Comparative Literature 141		W
Comparative Literature 144		W
Comparative Literature 145	D	W
Comparative Literature 146		W
Comparative Literature 147	D	W
Comparative Literature 148	D	W
Comparative Literature 151	D	W
Comparative Literature 152	D	W
Comparative Literature 152S	D	W
Comparative Literature 153	D	W
Comparative Literature 154	D	W
Comparative Literature 155	D	W
Comparative Literature 156	D	W
Comparative Literature 157		W
Comparative Literature 158		W
Comparative Literature 159	D	W
Comparative Literature 160A		W
Comparative Literature 160B		W
Comparative Literature 161A		W
Comparative Literature 161B		W
Comparative Literature 163		W
Comparative Literature 164A		W
Comparative Literature 164B		W
Comparative Literature 164C		W
Comparative Literature 164D		W
Comparative Literature 165	D	W
Comparative Literature 165S	D	W
Comparative Literature 166	D	W
Comparative Literature 166A		W
Comparative Literature 166B		W
Comparative Literature 167		W
Comparative Literature 168A		W
Comparative Literature 168B		W
Comparative Literature 169		W
Comparative Literature 170		W
Comparative Literature 180		W
Comparative Literature 180S		W
Critical Theory 101		W
Design 137B †		
Design 142A	D	
Design 142B	D	
Design 143		W
Design 144		W
Dramatic Art 1	D	W
Dramatic Art 1S	D	W
Dramatic Art 5	D	
Dramatic Art 20		
Dramatic Art 111S	D	W
Dramatic Art 114 †	D	W
Dramatic Art 144 †	D	
Dramatic Art 144B †	D	
Dramatic Art 150	D	W
Dramatic Art 151S		
Dramatic Art 154	D	W
Dramatic Art 155	D	W
Dramatic Art 155B		
Dramatic Art 156AN	D	W
Dramatic Art 156BN	D	W
Dramatic Art 156CN	D	W
Dramatic Art 156D	D	W
East Asian Studies 88	D	W
East Asian Studies 113	D	W
Education 147	D	W
English 3		*
English 4		W
English 30A	D	W
English 30B	D	W
English 105		W
English 106		
English 107		W
English 111		W
English 113A		W
English 113B		W
English 117		W
English 139	D	W
English 156		W
English 160		W
English 161A		W
English 161B		W
English 162		W
English 171A	D	W
English 171B	D	W
English 173		W
English 175		W
English 179	D	W
English 180		W
English 182	D	W
English 184		W
Entomology 1 †		
Film Studies 1		W
Film Studies 120	D	W
Film Studies 121	D	W
Film Studies 124		W
Film Studies 125		W
Film Studies 129	D	W
Film Studies 142		W
Film Studies 176A		W
Film Studies 176B		W
French 50		W
French 51	D	W
French 52	D	W
French 101		
French 102		
French 103		
French 107		
French 115		
French 116		
French 117A		
French 117B		
French 118A		
French 118B		
French 119A		
French 119B		
French 119C		
French 120		
French 121		
French 122		
French 124	D	
French 125		
French 127		
French 130		
French 133	D	
French 162		
German 40	D	W
German 48		W
German 101A		
German 101B		
German 105		W
German 112		W
German 113	D	W
German 114		W
German 115		W
German 116	D	W
German 117	D	W
German 118A		W
German 118B		W
German 118C		W
German 118E		
German 119		W
German 120		
German 121		
German 122		

* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.
† Also assigned to another area of topical breadth.
# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

German 123		
German 124		
German 125		
German 126		
German 127		
German 129	D	
German 131		
German 132		
German 133		
German 134		
German 141		W
German 142		W
German 143		
German 160		
German 168	D	
German 176A		W
German 185		
Greek 100N		W
Greek 101		W
Greek 102		W
Greek 103A		W
Greek 103B		W
Greek 104		W
Greek 105N		W
Greek 111		W
Greek 112		W
Greek 113		W
Greek 114		W
Greek 115		W
Greek 116		W
History 3 †	D	W
History 4A		W
History 4B		W
History 4C		W
History 6 †	D	W
History 7A †	D	W
History 7B †	D	W
History 7C †	D	W
History 8	D	
History 9A	D	W
History 9B	D	W
History 10A †	D	W
History 10B		W
History 10C		W
History 15	D	W
History 17A	D	W
History 17B	D	W
History 72A	D	W
History 72B	D	W
History 85		
History 102S		W
History 109A †		
History 110 †	D	W
History 111A		W
History 111B		W
History 111C		W
History 112A	D	W
History 112B	D	W
History 113	D	W
History 115A	D	W
History 115B	D	W
History 115C	D	W
History 115E	D	W
History 115F †	D	W
History 116		
History 121A		W
History 121B		W
History 121C		W
History 122		
History 125		W
History 130A	D	W
History 130B		
History 130C		
History 131A		
History 131B		W
History 131C		W
History 133		
History 134A		
History 135A		
History 135B		
History 136		W
History 138A		W
History 138B		W
History 138C		W
History 139A †		W
History 139B †		W
History 141		W
History 142A	D	W
History 142B	D	W
History 143	D	W
History 144B	D	W
History 145		W
History 146A		W
History 146B		W
History 147A †		W
History 147B †		W
History 147C †	D	W
History 148A	D	W
History 148B	D	W
History 148C	D	W
History 149 †	D	W
History 151A		W
History 151B		W
History 151C		W
History 151D	D	W
History 159	D	W
History 160	D	W
History 162	D	W
History 163A		
History 163B		
History 164		
History 165		
History 166A		
History 166B		
History 167		W
History 168		
History 169A	D	W
History 169B	D	W
History 170A	D	W
History 170B	D	W
History 170C		
History 171A	D	W
History 171B	D	W
History 171D		W
History 172		W
History 173	D	W
History 174A		W
History 174B		W
History 174C		W
History 174D		
History 175		W
History 176A		
History 176B		
History 177A †	D	W
History 177B †	D	W
History 178A	D	W
History 178B †	D	W
History 180AN		W
History 180BN		W
History 181		W
History 183A	D	W
History 183B	D	W
History 184	D	W
History 185A		W
History 185B		W
History 189		W
History 190A †	D	W
History 190B †	D	W
History 190C †	D	W
History 190D	D	W
History 191A	D	W
History 191B	D	W
History 191C	D	W
History 191D	D	W
History 191E	D	W
History 191F	D	W
History 193A †	D	W
History 193B †	D	W
History 194A	D	W
History 194B	D	
History 194C	D	
History 194D		
History 194E		
History 195B	D	W
History 196A	D	W
Humanities 1D (course 1 required concurrently)		W
Humanities 2A		
Humanities 2B		
Humanities 4D (course 4 required concurrently)		W
Humanities 7	D	W
Humanities 8 †	D	W
Humanities 9 (course 9D required concurrently)		#
Humanities 13	D	W
Humanities 15	D	W
Humanities 18 †	D	W
Humanities 60 †	D	W
Humanities 144		W
Humanities 180		W
Integrated Studies 8B		W
Italian 50		W
Italian 105		
Italian 105S	D	W
Italian 107		
Italian 107S		
Italian 108	D	W
Italian 108S	D	W
Italian 112		
Italian 113		
Italian 114		
Italian 115A		
Italian 115B		
Italian 115C		
Italian 115D		
Italian 118		
Italian 119		
Italian 120A		
Italian 120B		
Italian 121	D	W
Italian 131		
Italian 139B		
Italian 140		W
Italian 141	D	W
Italian 142		W
Italian 150	D	W
Japanese 10	D	W
Japanese 50	D	W
Japanese 101	D	W
Japanese 102	D	W
Japanese 103	D	W
Japanese 104	D	W
Japanese 105	D	W
Japanese 106	D	W
Japanese 107	D	W
Japanese 108	D	W
Japanese 109	D	
Japanese 151	D	W
Japanese 152	D	W
Japanese 156	D	W
Jewish Studies 101	D	W
Jewish Studies 110	D	W
Jewish Studies 111	D	W
Jewish Studies 112	D	W
Jewish Studies 120	D	W
Landscape Architecture 1 †		W
Landscape Architecture 30		W
Landscape Architecture 168 †		W
Latin 100N		W
Latin 101		W
Latin 102		W
Latin 103		W
Latin 104		W
Latin 105		W
Latin 106		W
Latin 108		W
Latin 109		W
Latin 110N		W
Latin 111		W
Latin 112		W
Latin 114		W
Latin 115		W
Latin 116		W
Latin 125		W
Linguistics 1 †		W
Linguistics 106		
Linguistics 150 †		W
Linguistics 182 †	D	W
Medieval Studies 20A		W
Medieval Studies 20B		W
Medieval Studies 20C		W
Medieval Studies 130A		W
Medieval Studies 130B		W
Middle East/S. Asian Std 100	D	W
Middle East/S. Asian Std 180	D	W
Music 10		W
Music 11	D	
Music 105	D	W
Music 106		W
Music 110A		W
Music 110B		W
Music 110C		W
Music 110D		W
Music 110E		W
Music 110F		W
Music 110G		W
Music 115		W
Music 129A	D	W
Music 129B	D	W
Music 129C	D	W
Music 129D	D	W
Native American Studies 5	D	*
Native American Studies 10 †	D	W
Native American Studies 33	D	
Native American Studies 101	D	
Native American Studies 156	D	W
Native American Studies 181A	D	W
Native American Studies 181B	D	W
Native American Studies 181C	D	W
Native American Studies 191	D	
Nature and Culture 1 †		W
Nature and Culture 100 †		W
Nature and Culture 120		W
Nature and Culture 130		W
Nature and Culture 140		W
Philosophy 1		W
Philosophy 11	D	W
Philosophy 14	D	W
Philosophy 15		W
Philosophy 21		W
Philosophy 22		W
Philosophy 24		W
Philosophy 30 †		W
Philosophy 31 †		
Philosophy 32 †		W
Philosophy 38		W
Philosophy 101		W
Philosophy 102		W
Philosophy 103		W
Philosophy 105		W
Philosophy 107 †		W
Philosophy 108 †		W
Philosophy 109 †		W
Philosophy 114		W
Philosophy 115		W
Philosophy 123		W
Philosophy 125		W
Philosophy 151		
Philosophy 157		
Religious Studies 1	D	W
Religious Studies 1A	D	W
Religious Studies 1B	D	W
Religious Studies 1C	D	W
Religious Studies 1D	D	W
Religious Studies 1E	D	W
Religious Studies 1F	D	W
Religious Studies 1G	D	W
Religious Studies 10A	D	W
Religious Studies 21	D	W
Religious Studies 23	D	W
Religious Studies 30	D	W
Religious Studies 40		W
Religious Studies 42	D	W
Religious Studies 60 †	D	W
Religious Studies 65C	D	W
Religious Studies 68	D	W
Religious Studies 90	D	
Religious Studies 103	D	W
Religious Studies 104	D	W
Religious Studies 106	D	W
Religious Studies 115	D	W
Religious Studies 120	D	W
Religious Studies 131	D	
Religious Studies 141A		W
Religious Studies 141B		W
Religious Studies 141C		W
Religious Studies 143	D	W
Religious Studies 144	D	W
Religious Studies 160 †	D	W
Religious Studies 161	D	W
Religious Studies 162 †	D	W
Religious Studies 165	D	W
Russian 45	D	W
Russian 102		
Russian 121		
Russian 123		
Russian 126		
Russian 127		
Russian 128		
Russian 129	D	W
Russian 130		
Russian 139	D	
Russian 140	D	W
Russian 141	D	W
Russian 142	D	W
Russian 150	D	W
Science & Tech Studies 120	D	W
Science & Tech Studies 130A †		W
Science & Tech Studies 130B		W
Science & Tech Studies 131 †		W
Science & Tech Studies 173		W
Science and Society 40 †	D	W
Science and Society 42 †		
Spanish 139	D	
Spanish 141	D	
Spanish 141S	D	
Spanish 143		

* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.
† Also assigned to another area of topical breadth.
# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Spanish 144
Spanish 147 ..... D W
Spanish 148 ..... D
Spanish 148S ..... D
Spanish 149 ..... D W
Spanish 160 ..... D W
Spanish 170 ..... D
Spanish 170S ..... D
Spanish 172 ..... D
Spanish 173 ..... D
Spanish 174 ..... D
Spanish 175 ..... D
Spanish 176 ..... D
Technocultural Studies 1
Technocultural Studies 2
Technocultural Studies 4
Technocultural Studies 5
Technocultural Studies 6
Technocultural Studies 150
Technocultural Studies 158
Women's Studies 20 ..... D W
Women's Studies 25 ..... D W
Women's Studies 50 † ..... D W
Women's Studies 60 † ..... D W
Women's Studies 70 † ..... D
Women's Studies 130 † ..... D
Women's Studies 136 † ..... D W
Women's Studies 137 † ..... D W
Women's Studies 138 † ..... D W
Women's Studies 158 † ..... D
Women's Studies 160 ..... D
Women's Studies 162 ..... D
Women's Studies 164 ..... D
Women's Studies 165 † ..... D
Women's Studies 170 † ..... D W
Women's Studies 178A ..... D W
Women's Studies 178B ..... D W
Women's Studies 178C ..... D W
Women's Studies 178D ..... D W
Women's Studies 178E ..... D W
Women's Studies 178F ..... D W
Women's Studies 179 ..... D W
Women's Studies 180 ..... D
Women's Studies 195 † ..... D

Science & Engineering

Animal Science 1 ..... W
Animal Science 2 ..... W
Animal Science 18
Animal Science 42 ..... W
Animal Science 104
Animal Science 105
Animal Science 106 ..... W
Animal Science 115
Animal Science 120
Animal Science 123
Animal Science 124 ..... W
Animal Science 136 ..... W
Animal Science 146 ..... W
Anthropology 1 ..... D W
Anthropology 5 ..... W
Anthropology 15 ..... D W
Anthropology 32 ..... D W
Anthropology 34 ..... D W
Anthropology 151 ..... W
Anthropology 152 ..... W
Anthropology 153 ..... W
Anthropology 154A ..... W
Anthropology 157 ..... #
Anthropology 158 ..... D W
Anthropology 181
Anthropology 183 ..... W
Astronomy 10G
Astronomy 10L
Astronomy 10S
Atmospheric Science 5
Atmospheric Science 6
Atmospheric Science 10 ..... W
Avian Sciences 11 ..... W
Avian Sciences 13 ..... W
Biological Sciences 10
Biological Sciences 10V ..... W
Biotechnology 1
Chemistry 2A
Chemistry 2B
Chemistry 2C
Chemistry 10 ..... W
Chemistry 150 ..... W
Chicano Studies 40 ..... D W
Chicano Studies 40S ..... D W
Chicano Studies 140A
Design 137B †
Engineering 6
Engineering 7
Engineering 10 ..... W
Engineering 17
Engineering 20
Engineering 160 †
Engr: Applied Sci-Davis 137
Engr: Biological Systems 75
Engineering Biomedical 161L
Engr: Civil & Environ 123 † ..... D W
Engr: Computer Science 15 ..... W
Entomology 1 †
Entomology 2 ..... W
Entomology 10
Entomology 100 ..... W
Entomology 101
Entomology 102
Entomology 103 ..... W
Entomology 104
Entomology 107 ..... W
Entomology 109 ..... W
Entomology 110 ..... W
Entomology 117 ..... W
Entomology 119 ..... W
Entomology 140S ..... W
Entomology 153 ..... W
Entomology 156 ..... #
Entomology 158 † ..... W
Environmental Horticulture 1 ..... W
Environ & Resource Science 8 † ..... W
Environ & Resource Science 30
Environ & Resource Science 100 ... #
Environ & Resource Science 121 ... W
Environ & Resource Science 131 ... W
Environ Science & Policy 10 ..... #
Environ Science & Policy 30 ..... #
Environ Science & Policy 116 ..... #
Environ Science & Policy 121 ..... W
Environmental Toxicology 10
Environmental Toxicology 20 ..... W
Environmental Toxicology 30
Environmental Toxicology 101
Environmental Toxicology 127
Environmental Toxicology 128
Environmental Toxicology 135
Environmental Toxicology 146
Evolution and Ecology 2 ..... W
Evolution and Ecology 11
Evolution and Ecology 12 ..... W
Evolution and Ecology 108
Evolution and Ecology 138 ..... W
Evolution and Ecology 141 ..... W
Exercise Biology 10 ..... D
Exercise Biology 106
Exercise Biology 106L
Exercise Biology 113
Exercise Biology 115
Exercise Biology 117
Exercise Biology 126
Fiber And Polymer Science 110 † .... W
Food Science & Technology 3
Food Science & Technology 10 †
Food Science & Technology 120
Food Science & Technology 128
Geology 1
Geology 2 ..... #
Geology 3 ..... #
Geology 4
Geology 10
Geology 16
Geology 16G ..... W
Geology 18
Geology 28
Geology 30
Geology 32
Geology 35
Geology 36 ..... W
Geology 100 ..... W
Geology 101 ..... W
Geology 105 ..... W
Geology 106 ..... W
Geology 108 ..... W
Geology 109 (course 109L required concurrently) ..... #
Geology 110 ..... W
Geology 115 † ..... W
Geology 134 ..... W
Geology 138
Geology 143 ..... W
Geology 145 ..... W
Human Development 117 ..... W
Hydrologic Science 10 † ..... W
Integrated Studies 8A ..... W
International Agricultural Dev 162 D W
Landscape Architecture 50
Linguistics 175
Math & Physical Sci 1
Mathematics 16A
Mathematics 16B
Mathematics 16C
Mathematics 17A
Mathematics 17B
Mathematics 17C
Mathematics 21A
Mathematics 21AH
Mathematics 21B
Mathematics 21BH
Mathematics 21C
Mathematics 21CH
Mathematics 21M
Mathematics 36
Med: Cell Bio & Human Anat 101
Med: Cell Bio & Human Anat 101L
Microbiology 10
Microbiology 100 †
Molecular and Cellular Biology 10
Nature and Culture 1 † ..... W
Nature and Culture 100 † ..... W
Nematology 10V ..... W
Neuro, Physio & Behavior 10
Neuro, Physio & Behavior 12 ..... #
Neuro, Physio & Behavior 14
Neuro, Physio & Behavior 15
Neuro, Physio & Behavior 68
Neuro, Physio & Behavior 132
Nutrition 10
Nutrition 11 ..... W
Nutrition 114 ..... W
Nutrition 115 ..... W
Nutrition 120AN † ..... D
Nutrition 120BN † ..... D
Nutrition 127
Philosophy 13 † ..... W
Philosophy 30 † ..... W
Philosophy 31 †
Philosophy 32 † ..... W
Philosophy 107 † ..... W
Philosophy 108 † ..... W
Physics 10 ..... W
Physics 30
Physics 160 †
Plant Biology 108
Plant Biology 112
Plant Biology 116
Plant Biology 143 ..... D W
Plant Biology 147 ..... W
Plant Pathology 140 ..... W
Plant Science 8
Plant Science 12 † ..... D W
Plant Science 14 ..... W
Plant Science 120
Plant Science 130 ..... W
Plant Science 141 † ..... W
Plant Science 142
Science & Tech Studies 1 †
Science & Tech Studies 20 † ..... W
Science & Tech Studies 130A † ..... W
Science & Tech Studies 130B ..... W
Science & Tech Studies 131 † ..... W
Science & Tech Studies 161 ..... W
Science and Society 1 † ..... D W
Science and Society 2 † ..... W
Science and Society 3 † ..... W
Science and Society 4 † ..... W
Science and Society 5 † ..... W
Science and Society 7 † ..... D W
Science and Society 8 † ..... W
Science and Society 9 † ..... W
Science and Society 10 † ..... W
Science and Society 11 † ..... W
Science and Society 12 † ..... D W
Science and Society 15 † ..... D W
Science and Society 18 † ..... W
Science and Society 20 † ..... W
Science and Society 25 † ..... D W
Science and Society 30 † ..... W
Science and Society 40 † ..... D W
Science and Society 42 †
Science and Society 70A †
Science and Society 120 † ..... W
Science and Society 135S † ..... D W
Soil Science 10
Statistics 10 † ..... W
Statistics 12
Statistics 13
Statistics 13V
Statistics 32
Statistics 100
Statistics 102
Statistics 103
Statistics 104
Statistics 106
Statistics 108
Statistics 120
Statistics 138
Statistics 144
Textiles & Clothing 6
Textiles & Clothing 162
Viticulture & Enology 3 † ..... #
Wild, Fish & Conserv Biol 10 ..... D W
Wild, Fish & Conserv Biol 11 ..... W
Wild, Fish & Conserv Biol 50 ..... W
Wild, Fish & Conserv Biol 102L .... W
Wild, Fish & Conserv Biol 121 ..... W
Wild, Fish & Conserv Biol 153 ..... W
Wild, Fish & Conserv Biol 155 ..... W
Wild, Fish & Conserv Biol 156 ..... W

Social Sciences

Afr Am & Afr Std 18 ..... D
Afr Am & Afr Std 80 ..... D W
Afr Am & Afr Std 110 ..... D
Afr Am & Afr Std 133 ..... D
Afr Am & Afr Std 145A ..... D
Afr Am & Afr Std 145B ..... D
Afr Am & Afr Std 165 ..... D
Afr Am & Afr Std 180 † ..... D
Agricult & Res Econ 1
Agricult & Res Econ 15 ..... D W
Agricult & Res Econ 115A ..... D
Agricult & Res Econ 115B
Agricult & Res Econ 120
Agricult & Res Econ 146
Agricult & Res Econ 147
Agricult & Res Econ 150 ..... D W
Agricult & Res Econ 175
Agricult & Res Econ 176
Agricultural Education 100 ..... W
Agricultural Education 160 ..... W
Agricultural Education 172 ..... W
American Studies 1B † ..... D W
American Studies 1C † ..... D W
American Studies 1E † ..... D W
American Studies 5 † ..... W
American Studies 10 † ..... D W
American Studies 25 † ..... D W
American Studies 30 † ..... D W
American Studies 55 † ..... D W
American Studies 59 † ..... D W
American Studies 110 † ..... D W
American Studies 120 † ..... D W
American Studies 130 † ..... D W
American Studies 139 ..... D W
American Studies 151 † ..... D W
American Studies 152 † ..... D W
American Studies 153 † ..... D W
American Studies 154 † ..... D W
American Studies 155 † ..... D W
American Studies 156 † ..... D W
American Studies 157 † ..... D W
Animal Science 141 ..... W
Animal Science 148 ..... W
Animal Science 170 ..... W
Anthropology 2 ..... D W
Anthropology 3 ..... D
Anthropology 4 ..... D W
Anthropology 13 ..... W
Anthropology 131 ..... D
Anthropology 20 ..... D
Anthropology 23 ..... D W
Anthropology 24 ..... D W
Anthropology 50 ..... D W
Anthropology 100
Anthropology 101 ..... D W
Anthropology 102 ..... D W
Anthropology 104N ..... D
Anthropology 105 ..... W
Anthropology 109 ..... W
Anthropology 110 ..... D W
Anthropology 117 ..... D W
Anthropology 120 ..... D W
Anthropology 122A ..... D W
Anthropology 122B ..... D W
Anthropology 124 ..... D W

* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.
† Also assigned to another area of topical breadth.
# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Anthropology 125A ..... D
Anthropology 125B ..... D W
Anthropology 126A ..... D W
Anthropology 126B ..... D W
Anthropology 127 ..... D W
Anthropology 128A ..... D W
Anthropology 128B ..... D W
Anthropology 129 ..... D W
Anthropology 130A ..... W
Anthropology 130BN ..... W
Anthropology 131 ..... D
Anthropology 134 ..... D W
Anthropology 136 ..... W
Anthropology 138
Anthropology 139AN ..... D W
Anthropology 139BN ..... D W
Anthropology 140A ..... D W
Anthropology 140B ..... D W
Anthropology 141B ..... D W
Anthropology 142 ..... D W
Anthropology 143A ..... D W
Anthropology 144 ..... D W
Anthropology 145 † ..... D W
Anthropology 148A ..... D W
Anthropology 149A ..... D W
Anthropology 149B ..... D W
Anthropology 172 ..... D W
Anthropology 173 ..... D W
Anthropology 176 ..... D W
Anthropology 178 ..... D W
Anthropology 184
Asian American Studies 1 ..... D W
Asian American Studies 2 ..... D W
Asian American Studies 3 ..... D
Asian American Studies 100 ..... D
Asian American Studies 112 † ..... D
Asian American Studies 114 ..... W
Asian American Studies 131 ..... D
Asian American Studies 141 † ..... D
Asian American Studies 150B ..... D W
Asian American Studies 150C ..... D
Asian American Studies 150D ..... D
Asian American Studies 150E ..... D
Chicano Studies 23
Chicano Studies 110 ..... D W
Chicano Studies 112 ..... D W
Chicano Studies 120 ..... D
Chicano Studies 121 ..... D W
Chicano Studies 123 ..... D W
Chicano Studies 131 ..... D
Chicano Studies 131S ..... D
Chicano Studies 182 † ..... D W
Communication 101
Communication 103
Communication 105
Communication 134
Communication 135 ..... D
Communication 136
Communication 138
Communication 140
Communication 141
Communication 142
Communication 143 ..... W
Communication 146
Communication 152
Communication 165
Communication 170
Communication 189A ..... W
Communication 189B ..... W
Communication 189C ..... W
Communication 189D ..... W
Comm & Reg Develpmnt 1 ..... D W
Comm & Reg Develpmnt 2 ..... D W
Comm & Reg Develpmnt 118 ..... W
Comm & Reg Develpmnt 140 ..... W
Comm & Reg Develpmnt 151 ..... D W
Comm & Reg Develpmnt 152 ..... W
Comm & Reg Develpmnt 153A ..... D
Comm & Reg Develpmnt 153B ..... D
Comm & Reg Develpmnt 154 ..... D W
Comm & Reg Develpmnt 157 ..... D W
Comm & Reg Develpmnt 176 ..... D W
Comm & Reg Develpmnt 180
Consumer Sciences 100 ..... D W
Dramatic Art 114 † ..... D W
Dramatic Art 144 † ..... D
Dramatic Art 144B † ..... D
Economics 1A
Economics 1B
Economics 110A
Economics 110B
Economics 111A
Economics 111B
Economics 115A ..... D
Economics 115B
Economics 121A
Economics 162
Education 110 ..... W
Education 120 ..... W
Education 122 ..... D W
Education 245
Engineering 160 †
Engr: Civil & Environ 123 † ..... D W
Engr: Civil & Environ 165 ..... W
Entomology 158 † ..... W
Environ & Resource Science 8 † ..... W
Environ Science & Policy 101 ..... D W
Environ Science & Policy 102 ..... D W
Environ Science & Policy 105 ..... W
Environ Science & Policy 161 ..... W
Environ Science & Policy 169
Environ Science & Policy 172
Environ Science & Policy 175
Exercise Biology 102
Exercise Biology 120 ..... D
Fiber And Polymer Science 110 † .... W
Food Science & Technology 10 †
French 53 ..... D W
Geology 115 † ..... W
History 3 † ..... D W
History 6 † ..... D W
History 7A † ..... D W
History 7B † ..... D W
History 7C † ..... D W
History 10A † ..... D W
History 109A †
History 110 † ..... D W
History 115D ..... D W
History 115F † ..... D W
History 132 ..... D W
History 139A † ..... W
History 139B † ..... W
History 140
History 147A † ..... W
History 147B † ..... W
History 147C † ..... D W
History 149 † ..... D W
History 177A † ..... D W
History 177B † ..... D W
History 178B † ..... D W
History 179 ..... D W
History 190A † ..... D W
History 190B † ..... D W
History 190C † ..... D W
History 193A † ..... D W
History 193B † ..... D W
History 196B ..... D W
Human Development 102 ..... W
Human Development 161 ..... W
Humanities 3 ..... W
Humanities 8 † ..... D W
Humanities 18 † ..... D W
Humanities 60 † ..... D W
Hydrologic Science 10 † ..... W
Integrated Studies 8C ..... W
International Agricultural Dev 10 ... D W
International Agricultural Dev 103 . D
Jewish Studies 10 ..... D W
Jewish Studies 121 ..... W
Landscape Architecture 1 † ..... W
Landscape Architecture 2 ..... W
Landscape Architecture 3 ..... W
Landscape Architecture 168 † ..... W
Linguistics 1 † ..... W
Linguistics 6 ..... D W
Linguistics 150 † ..... W
Linguistics 160 ..... D W
Linguistics 163 ..... D W
Linguistics 171
Linguistics 177
Linguistics 182 † ..... D W
Med - Public Health Sciences 175W W
Microbiology 100 †
Native American Studies 1 ..... D
Native American Studies 10 † ..... D W
Native American Studies 46 ..... D W
Native American Studies 55 ..... D W
Native American Studies 115 ..... D W
Native American Studies 116 ..... D
Native American Studies 117 ..... D
Native American Studies 118 ..... D
Native American Studies 120 ..... D W
Native American Studies 122 ..... D W
Native American Studies 130A ..... D W
Native American Studies 130B ..... D W
Native American Studies 130C ..... D W
Native American Studies 133 ..... D
Native American Studies 133A ..... D W
Native American Studies 133B ..... D W
Native American Studies 134 ..... D W
Native American Studies 180 ..... D W
Nutrition 120AN † ..... D
Nutrition 120BN † ..... D
Philosophy 13 † ..... W
Philosophy 17 ..... W
Philosophy 104
Philosophy 109 † ..... W
Philosophy 118 ..... D W
Philosophy 119 ..... D W
Physical Education 120 ..... D
Physics 160 †
Plant Science 12 † ..... D W
Plant Science 141 † ..... W
Political Science 1 ..... W
Political Science 2 ..... W
Political Science 3 ..... W
Political Science 4 ..... W
Political Science 5 ..... W
Political Science 7 ..... W
Political Science 51
Political Science 100 ..... W
Political Science 102 ..... W
Political Science 104 ..... W
Political Science 105 ..... W
Political Science 106 ..... W
Political Science 107 ..... W
Political Science 108 ..... W
Political Science 109 ..... W
Political Science 110 ..... W
Political Science 112 ..... W
Political Science 113 ..... W
Political Science 114 ..... W
Political Science 115 ..... W
Political Science 116 ..... W
Political Science 118A ..... W
Political Science 118B ..... W
Political Science 118C ..... W
Political Science 119 ..... W
Political Science 120 ..... W
Political Science 121 ..... W
Political Science 122 ..... W
Political Science 123 ..... W
Political Science 124 ..... D W
Political Science 126 ..... D W
Political Science 129 ..... W
Political Science 130 ..... W
Political Science 131 ..... W
Political Science 132 ..... W
Political Science 135 ..... W
Political Science 136 ..... W
Political Science 137 ..... W
Political Science 140A ..... W
Political Science 140B ..... D W
Political Science 140C ..... W
Political Science 142A ..... W
Political Science 142B ..... W
Political Science 143A ..... D W
Political Science 143B ..... D W
Political Science 144A ..... W
Political Science 144B ..... W
Political Science 146A ..... D W
Political Science 146B ..... D W
Political Science 147A ..... W
Political Science 147B ..... W
Political Science 147C ..... W
Political Science 147D ..... W
Political Science 148A ..... W
Political Science 148B ..... D W
Political Science 148C ..... D W
Political Science 150 ..... W
Political Science 151 ..... W
Political Science 152 ..... D W
Political Science 153 ..... W
Political Science 154 ..... W
Political Science 155 ..... W
Political Science 160 ..... W
Political Science 162 ..... W
Political Science 163 ..... W
Political Science 164 ..... W
Political Science 165 ..... W
Political Science 166 ..... D
Political Science 168 ..... D W
Political Science 170 ..... W
Political Science 171 ..... W
Political Science 172 ..... W
Political Science 174 ..... W
Political Science 175 ..... W
Political Science 176 ..... D W
Political Science 179 ..... W
Political Science 180 ..... W
Political Science 183 ..... W
Political Science 187 ..... W
Political Science 190 ..... W
Political Science 192A ..... W
Political Science 192B ..... W
Psychology 1
Psychology 142 ..... W
Psychology 155
Psychology 158 ..... D W
Psychology 162 ..... W
Psychology 168
Psychology 175 ..... W
Psychology 185 ..... W
Religious Studies 60 † ..... D W
Religious Studies 160 † ..... D W
Religious Studies 162 † ..... D W
Science & Tech Studies 1 †
Science & Tech Studies 20 † ..... W
Science & Tech Studies 32 ..... D W
Science & Tech Studies 109 ..... W
Science & Tech Studies 129 ..... D W
Science & Tech Studies 150 ..... D W
Science & Tech Studies 163
Science & Tech Studies 165 ..... W
Science and Society 1 † ..... D W
Science and Society 2 † ..... W
Science and Society 3 † ..... W
Science and Society 4 † ..... W
Science and Society 5 † ..... W
Science and Society 7 † ..... D W
Science and Society 8 † ..... W
Science and Society 9 † ..... W
Science and Society 10 † ..... W
Science and Society 11 † ..... W
Science and Society 12 † ..... D W
Science and Society 15 † ..... D W
Science and Society 18 † ..... W
Science and Society 20 † ..... W
Science and Society 25 † ..... D W
Science and Society 30 † ..... W
Science and Society 40 † ..... D W
Science and Society 70A †
Science and Society 120 † ..... W
Science and Society 135S † ..... D W
Science and Society 140 ..... W
Sociology 1
Sociology 2 ..... W
Sociology 3 ..... W
Sociology 4 ..... D W
Sociology 5 ..... D W
Sociology 11 ..... W
Sociology 25 ..... W
Sociology 30A ..... D
Sociology 30B ..... D
Sociology 125
Sociology 131 ..... D W
Sociology 132 ..... D
Sociology 146 ..... D W
Sociology 156
Sociology 170
Statistics 10 † ..... W
Textiles & Clothing 7 ..... D W
Textiles & Clothing 8 ..... D
Textiles & Clothing 107 ..... D W
Textiles & Clothing 174 ..... D
Viticulture & Enology 3 † ..... #
Washington Center 175 ..... W
Women's Studies 50 † ..... D W
Women's Studies 60 † ..... D W
Women's Studies 70 † ..... D
Women's Studies 102 ..... D
Women's Studies 130 † ..... D
Women's Studies 136 † ..... D W
Women's Studies 137 † ..... D W
Women's Studies 138 † ..... D W
Women's Studies 139 ..... D W
Women's Studies 140 ..... D
Women's Studies 158 † ..... D
Women's Studies 165 † ..... D
Women's Studies 170 † ..... D W
Women's Studies 182 ..... D W
Women's Studies 184 ..... D W
Women's Studies 187 ..... D
Women's Studies 195 † ..... D

* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.
† Also assigned to another area of topical breadth.
# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

SOCIAL-CULTURAL DIVERSITY

These courses satisfy the GE requirement for social-cultural diversity. Many of these courses also provide GE credit for topical breadth or writing experience. Refer to the topical breadth and writing experience course lists to determine if any additional GE credit applies.

Afr Am & Afr Std 10
Afr Am & Afr Std 12
Afr Am & Afr Std 15
Afr Am & Afr Std 16
Afr Am & Afr Std 17
Afr Am & Afr Std 18
Afr Am & Afr Std 50
Afr Am & Afr Std 52
Afr Am & Afr Std 80
Afr Am & Afr Std 100
Afr Am & Afr Std 107A
Afr Am & Afr Std 107B
Afr Am & Afr Std 107C
Afr Am & Afr Std 110
Afr Am & Afr Std 111
Afr Am & Afr Std 123
Afr Am & Afr Std 133
Afr Am & Afr Std 145A
Afr Am & Afr Std 145B
Afr Am & Afr Std 150A
Afr Am & Afr Std 150B
Afr Am & Afr Std 152
Afr Am & Afr Std 156
Afr Am & Afr Std 157
Afr Am & Afr Std 160
Afr Am & Afr Std 162
Afr Am & Afr Std 163
Afr Am & Afr Std 165
Afr Am & Afr Std 168
Afr Am & Afr Std 169
Afr Am & Afr Std 170
Afr Am & Afr Std 171
Afr Am & Afr Std 172
Afr Am & Afr Std 175A
Afr Am & Afr Std 180
Afr Am & Afr Std 181
Afr Am & Afr Std 185
Agricult & Res Econ 15
Agricult & Res Econ 115A
Agricult & Res Econ 150
American Studies 1A
American Studies 1B
American Studies 1C
American Studies 1E
American Studies 10
American Studies 21
American Studies 25
American Studies 30
American Studies 55
American Studies 59
American Studies 110
American Studies 120
American Studies 130
American Studies 139
American Studies 151
American Studies 152
American Studies 153
American Studies 154
American Studies 155
American Studies 156
American Studies 157
Anthropology 1
Anthropology 2
Anthropology 3
Anthropology 4
Anthropology 131
Anthropology 15
Anthropology 20
Anthropology 23
Anthropology 24
Anthropology 32
Anthropology 34
Anthropology 50
Anthropology 101
Anthropology 102
Anthropology 104N
Anthropology 110
Anthropology 117
Anthropology 120
Anthropology 122A
Anthropology 122B
Anthropology 124
Anthropology 125A
Anthropology 125B
Anthropology 126A
Anthropology 126B
Anthropology 127
Anthropology 128A
Anthropology 128B
Anthropology 129
Anthropology 131
Anthropology 134
Anthropology 139AN
Anthropology 139BN
Anthropology 140A
Anthropology 140B
Anthropology 141B
Anthropology 142
Anthropology 143A
Anthropology 144
Anthropology 145
Anthropology 148A
Anthropology 149A
Anthropology 149B
Anthropology 158
Anthropology 172
Anthropology 173
Anthropology 176
Anthropology 178
Art History 1C
Art History 1D
Art History 1DV
Art History 1E
Art History 5
Art History 150
Art History 151
Art History 152
Art History 153
Art History 155
Art History 156
Art History 163A
Art History 163B
Art History 163C
Art History 163D
Art History 164
Art History 175
Art History 183B
Art History 183C
Art History 185
Art History 186
Art History 187
Art History 188A
Art History 189
Art Studio 30
Art Studio 149
Asian American Studies 1
Asian American Studies 2
Asian American Studies 3
Asian American Studies 4
Asian American Studies 100
Asian American Studies 112
Asian American Studies 115
Asian American Studies 116
Asian American Studies 130
Asian American Studies 131
Asian American Studies 141
Asian American Studies 150B
Asian American Studies 150C
Asian American Studies 150D
Asian American Studies 150E
Chicano Studies 10
Chicano Studies 21
Chicano Studies 30
Chicano Studies 40
Chicano Studies 40S
Chicano Studies 50
Chicano Studies 60
Chicano Studies 65
Chicano Studies 70
Chicano Studies 110
Chicano Studies 112
Chicano Studies 120
Chicano Studies 121
Chicano Studies 123
Chicano Studies 130
Chicano Studies 131
Chicano Studies 131S
Chicano Studies 150
Chicano Studies 154
Chicano Studies 160
Chicano Studies 181
Chicano Studies 182
Chinese 10
Chinese 11
Chinese 50
Chinese 100A
Chinese 101
Chinese 102
Chinese 103
Chinese 104
Chinese 105
Chinese 106
Chinese 107
Chinese 108
Chinese 109A
Chinese 109C
Chinese 109D
Chinese 109E
Chinese 109G
Chinese 109H
Chinese 109I
Chinese 110
Classics 15
Classics 171
Classics 175
Communication 135
Comm & Reg Develpmnt 1
Comm & Reg Develpmnt 2
Comm & Reg Develpmnt 151
Comm & Reg Develpmnt 153A
Comm & Reg Develpmnt 153B
Comm & Reg Develpmnt 154
Comm & Reg Develpmnt 157
Comm & Reg Develpmnt 176
Comparative Literature 4
Comparative Literature 5
Comparative Literature 6
Comparative Literature 7
Comparative Literature 9
Comparative Literature 12
Comparative Literature 25
Comparative Literature 53A
Comparative Literature 53B
Comparative Literature 53C
Comparative Literature 100
Comparative Literature 110
Comparative Literature 135
Comparative Literature 138
Comparative Literature 145
Comparative Literature 147
Comparative Literature 148
Comparative Literature 151
Comparative Literature 152
Comparative Literature 152S
Comparative Literature 153
Comparative Literature 154
Comparative Literature 155
Comparative Literature 156
Comparative Literature 159
Comparative Literature 165
Comparative Literature 165S
Comparative Literature 166
Consumer Sciences 100
Design 142A
Design 142B
Dramatic Art 1
Dramatic Art 1S
Dramatic Art 5
Dramatic Art 111S
Dramatic Art 114
Dramatic Art 144
Dramatic Art 144B
Dramatic Art 150
Dramatic Art 154
Dramatic Art 155
Dramatic Art 156AN
Dramatic Art 156BN
Dramatic Art 156CN
Dramatic Art 156D
East Asian Studies 88
East Asian Studies 113
Economics 115A
Education 122
Education 147
Engr: Civil & Environ 123
English 30A
English 30B
English 125
English 139
English 140
English 141
English 166
English 167
English 171A
English 171B
English 178
English 179
English 181A
English 181B
English 182
English 185A
English 185B
English 185C
English 186
Environ Science & Policy 101
Environ Science & Policy 102
Exercise Biology 10
Exercise Biology 120
Film Studies 120
Film Studies 121
Film Studies 129
French 51
French 52
French 53
French 124
French 133
German 40
German 113
German 116
German 117
German 129
German 168
History 3
History 6
History 7A
History 7B
History 7C
History 8
History 9A
History 9B
History 10A
History 15
History 17A
History 17B
History 72A
History 72B
History 110
History 112A
History 112B
History 113
History 115A
History 115B
History 115C
History 115D
History 115E
History 115F
History 130A
History 132
History 142A
History 142B
History 143
History 144B
History 147C
History 148A
History 148B
History 148C
History 149
History 151D
History 159
History 160
History 162
History 169A
History 169B
History 170A
History 170B
History 171A

* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.
† Also assigned to another area of topical breadth.
# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

History 171B
History 173
History 177A
History 177B
History 178A
History 178B
History 179
History 183A
History 183B
History 184
History 190A
History 190B
History 190C
History 190D
History 191A
History 191B
History 191C
History 191D
History 191E
History 191F
History 193A
History 193B
History 194A
History 194B
History 194C
History 195B
History 196A
History 196B
Human Development 12
Human Development 103
Human Development 160
Humanities 7
Humanities 8
Humanities 13
Humanities 15
Humanities 18
Humanities 60
International Agricultural Dev 10
International Agricultural Dev 103
International Agricultural Dev 162
Italian 105S
Italian 108
Italian 108S
Italian 121
Italian 141
Italian 150
Japanese 10
Japanese 50
Japanese 101
Japanese 102
Japanese 103
Japanese 104
Japanese 105
Japanese 106
Japanese 107
Japanese 108
Japanese 109
Japanese 151
Japanese 152
Japanese 156
Jewish Studies 10
Jewish Studies 101
Jewish Studies 110
Jewish Studies 111
Jewish Studies 112
Jewish Studies 120
Linguistics 6
Linguistics 160
Linguistics 163
Linguistics 166
Linguistics 180
Linguistics 182
Middle East/S. Asian Std 100
Middle East/S. Asian Std 180
Music 11
Music 28
Music 105
Music 126
Music 129A
Music 129B
Music 129C
Music 129D
Native American Studies 1
Native American Studies 5
Native American Studies 10
Native American Studies 32
Native American Studies 33
Native American Studies 46
Native American Studies 55
Native American Studies 101
Native American Studies 107
Native American Studies 108
Native American Studies 110A
Native American Studies 110B
Native American Studies 110C
Native American Studies 110D
Native American Studies 115
Native American Studies 116
Native American Studies 117
Native American Studies 118
Native American Studies 120
Native American Studies 122
Native American Studies 130A
Native American Studies 130B
Native American Studies 130C
Native American Studies 133
Native American Studies 133A
Native American Studies 133B
Native American Studies 134
Native American Studies 156
Native American Studies 157
Native American Studies 180
Native American Studies 181A
Native American Studies 181B
Native American Studies 181C
Native American Studies 188
Native American Studies 191
Nutrition 120AN
Nutrition 120BN
Philosophy 11
Philosophy 14
Philosophy 118
Philosophy 119
Physical Education 120
Plant Biology 143
Plant Science 12
Political Science 124
Political Science 126
Political Science 140B
Political Science 143A
Political Science 143B
Political Science 146A
Political Science 146B
Political Science 148B
Political Science 148C
Political Science 152
Political Science 166
Political Science 168
Political Science 176
Psychology 157
Psychology 158
Psychology 170
Religious Studies 1
Religious Studies 1A
Religious Studies 1B
Religious Studies 1C
Religious Studies 1D
Religious Studies 1E
Religious Studies 1F
Religious Studies 1G
Religious Studies 10A
Religious Studies 21
Religious Studies 23
Religious Studies 30
Religious Studies 42
Religious Studies 60
Religious Studies 65C
Religious Studies 68
Religious Studies 80
Religious Studies 90
Religious Studies 103
Religious Studies 104
Religious Studies 106
Religious Studies 115
Religious Studies 120
Religious Studies 131
Religious Studies 143
Religious Studies 144
Religious Studies 160
Religious Studies 161
Religious Studies 162
Religious Studies 165
Russian 45
Russian 129
Russian 139
Russian 140
Russian 141
Russian 142
Russian 150
Science & Tech Studies 32
Science & Tech Studies 120
Science & Tech Studies 129
Science & Tech Studies 150
Science and Society 1
Science and Society 7
Science and Society 12
Science and Society 15
Science and Society 25
Science and Society 40
Science and Society 135S
Sociology 4
Sociology 5
Sociology 30A
Sociology 30B
Sociology 128
Sociology 129
Sociology 130
Sociology 131
Sociology 132
Sociology 133
Sociology 134
Sociology 135
Sociology 145A
Sociology 145B
Sociology 146
Sociology 149
Sociology 172
Spanish 139
Spanish 141
Spanish 141S
Spanish 147
Spanish 148
Spanish 148S
Spanish 149
Spanish 160
Spanish 170
Spanish 170S
Spanish 172
Spanish 173
Spanish 174
Spanish 175
Spanish 176
Technocultural Studies 159
Textiles & Clothing 7
Textiles & Clothing 8
Textiles & Clothing 107
Textiles & Clothing 174
Wild, Fish & Conserv Biol 10
Women's Studies 20
Women's Studies 25
Women's Studies 50
Women's Studies 60
Women's Studies 70
Women's Studies 102
Women's Studies 130
Women's Studies 136
Women's Studies 137
Women's Studies 138
Women's Studies 139
Women's Studies 140
Women's Studies 158
Women's Studies 160
Women's Studies 162
Women's Studies 164
Women's Studies 165
Women's Studies 170
Women's Studies 178A
Women's Studies 178B
Women's Studies 178C
Women's Studies 178D
Women's Studies 178E
Women's Studies 178F
Women's Studies 179
Women's Studies 180
Women's Studies 182
Women's Studies 184
Women's Studies 187
Women's Studies 195

WRITING EXPERIENCE

These courses satisfy the GE requirement for writing experience. Many of these courses also provide GE credit for topical breadth or social-cultural diversity. Refer to the topical breadth and social-cultural diversity course lists to determine if any additional GE credit applies.

Afr Am & Afr Std 12
Afr Am & Afr Std 15
Afr Am & Afr Std 16
Afr Am & Afr Std 17
Afr Am & Afr Std 50
Afr Am & Afr Std 52
Afr Am & Afr Std 80
Afr Am & Afr Std 107A
Afr Am & Afr Std 107B
Afr Am & Afr Std 107C
Afr Am & Afr Std 111
Afr Am & Afr Std 152
Afr Am & Afr Std 157
Afr Am & Afr Std 162
Afr Am & Afr Std 163
Afr Am & Afr Std 170
Afr Am & Afr Std 172
Afr Am & Afr Std 175A
Afr Am & Afr Std 185
Agricult & Res Econ 15
Agricult & Res Econ 150
Agricultural Education 100
Agricultural Education 160
Agricultural Education 172
American Studies 1A
American Studies 1B
American Studies 1C
American Studies 1E
American Studies 5
American Studies 10
American Studies 21
American Studies 25
American Studies 30
American Studies 55
American Studies 59
American Studies 110
American Studies 120
American Studies 130
American Studies 139
American Studies 151
American Studies 152
American Studies 153
American Studies 154
American Studies 155
American Studies 156
American Studies 157
Animal Science 1
Animal Science 2
Animal Science 42
Animal Science 106
Animal Science 124
Animal Science 136
Animal Science 141
Animal Science 146
Animal Science 148
Animal Science 170
Anthropology 1
Anthropology 2
Anthropology 4
Anthropology 5
Anthropology 13
Anthropology 15
Anthropology 23
Anthropology 24
Anthropology 32
Anthropology 34
Anthropology 50
Anthropology 101

* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.
† Also assigned to another area of topical breadth.
# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Anthropology 102
Anthropology 105
Anthropology 109
Anthropology 110
Anthropology 117
Anthropology 120
Anthropology 122A
Anthropology 122B
Anthropology 124
Anthropology 125B
Anthropology 126A
Anthropology 126B
Anthropology 127
Anthropology 128A
Anthropology 128B
Anthropology 129
Anthropology 130A
Anthropology 130BN
Anthropology 134
Anthropology 136
Anthropology 139AN
Anthropology 139BN
Anthropology 140A
Anthropology 140B
Anthropology 141B
Anthropology 142
Anthropology 143A
Anthropology 144
Anthropology 145
Anthropology 148A
Anthropology 149A
Anthropology 149B
Anthropology 151
Anthropology 152
Anthropology 153
Anthropology 154A
Anthropology 154BN
Anthropology 157L (course 157 required concurrently)
Anthropology 158
Anthropology 172
Anthropology 173
Anthropology 176
Anthropology 178
Anthropology 183
Art History 5
Art History 100
Art History 110
Art History 153
Art History 155
Art History 156
Art History 163A
Art History 163B
Art History 163C
Art History 163D
Art History 164
Art History 168
Art History 172A
Art History 172B
Art History 173
Art History 175
Art History 176A
Art History 176B
Art History 177A
Art History 177B
Art History 178A
Art History 178B
Art History 178C
Art History 179B
Art History 182
Art History 183B
Art History 183C
Art History 184
Art History 185
Art History 186
Art History 187
Art History 188A
Art History 188B
Art History 188D
Art History 188E
Art History 189
Art Studio 26
Art Studio 30
Art Studio 147
Art Studio 148
Art Studio 149
Art Studio 150
Asian American Studies 1
Asian American Studies 2
Asian American Studies 4
Asian American Studies 114
Asian American Studies 150B
Atmospheric Science 10
Avian Sciences 11
Avian Sciences 13
Biological Sciences 10V
Biological Sciences 132
Biotechnology 188
Chemistry 10
Chemistry 115
Chemistry 125
Chemistry 150
Chicano Studies 10
Chicano Studies 21S
Chicano Studies 40
Chicano Studies 40S
Chicano Studies 110
Chicano Studies 112
Chicano Studies 121
Chicano Studies 123
Chicano Studies 150
Chicano Studies 181
Chicano Studies 182
Chinese 10
Chinese 11
Chinese 50
Chinese 100A
Chinese 102
Chinese 103
Chinese 104
Chinese 105
Chinese 106
Chinese 107
Chinese 108
Chinese 109A
Chinese 109C
Chinese 109D
Chinese 109E
Chinese 109G
Chinese 109H
Chinese 109I
Chinese 110
Classics 1
Classics 2
Classics 15
Classics 20
Classics 50
Classics 102
Classics 110
Classics 140
Classics 141
Classics 142
Classics 143
Classics 150
Classics 171
Classics 172A
Classics 172B
Classics 173
Classics 174
Classics 175
Classics 190
Communication 1 *
Communication 143
Communication 189A
Communication 189B
Communication 189C
Communication 189D
Comm & Reg Develpmnt 1
Comm & Reg Develpmnt 2
Comm & Reg Develpmnt 118
Comm & Reg Develpmnt 140
Comm & Reg Develpmnt 151
Comm & Reg Develpmnt 152
Comm & Reg Develpmnt 154
Comm & Reg Develpmnt 157
Comm & Reg Develpmnt 176
Comparative Literature 1 *
Comparative Literature 1
Comparative Literature 2 *
Comparative Literature 2
Comparative Literature 3 *
Comparative Literature 3
Comparative Literature 4 *
Comparative Literature 5
Comparative Literature 6
Comparative Literature 7
Comparative Literature 8
Comparative Literature 9
Comparative Literature 12
Comparative Literature 13
Comparative Literature 14
Comparative Literature 20
Comparative Literature 25
Comparative Literature 53A
Comparative Literature 53B
Comparative Literature 53C
Comparative Literature 100
Comparative Literature 110
Comparative Literature 120
Comparative Literature 135
Comparative Literature 138
Comparative Literature 140
Comparative Literature 141
Comparative Literature 144
Comparative Literature 145
Comparative Literature 146
Comparative Literature 147
Comparative Literature 148
Comparative Literature 151
Comparative Literature 152
Comparative Literature 152S
Comparative Literature 153
Comparative Literature 154
Comparative Literature 155
Comparative Literature 156
Comparative Literature 157
Comparative Literature 158
Comparative Literature 159
Comparative Literature 160A
Comparative Literature 160B
Comparative Literature 161A
Comparative Literature 161B
Comparative Literature 163
Comparative Literature 164A
Comparative Literature 164B
Comparative Literature 164C
Comparative Literature 164D
Comparative Literature 165
Comparative Literature 165S
Comparative Literature 166
Comparative Literature 166A
Comparative Literature 166B
Comparative Literature 167
Comparative Literature 168A
Comparative Literature 168B
Comparative Literature 169
Comparative Literature 170
Comparative Literature 180
Comparative Literature 180S
Consumer Sciences 100
Critical Theory 101
Design 143
Design 144
Dramatic Art 1
Dramatic Art 1S
Dramatic Art 111S
Dramatic Art 114
Dramatic Art 150
Dramatic Art 154
Dramatic Art 155
Dramatic Art 156AN
Dramatic Art 156BN
Dramatic Art 156CN
Dramatic Art 156D
Dramatic Art 158
East Asian Studies 88
East Asian Studies 113
Education 110
Education 119
Education 120
Education 122
Education 147
Engineering 10
Engineering 45
Engineering Biomedical 116
Engr: Chemical 155A
Engr: Chemical 155B
Engr: Chemical 161L
Engr: Civil & Environ 123
Engr: Civil & Environ 146
Engr: Civil & Environ 155
Engr: Civil & Environ 163
Engr: Civil & Environ 165
Engr: Computer Science 15
Engr: Computer Science 188
Engr: Materials Science 162L
Engr: Materials Science 172L
Engr: Materials Science 174
Engr: Materials Science 174L
Engr: Materials Science 180
Engr: Materials Science 181
Engr: Materials Science 182
English 3 *
English 4
English 5F
English 10A
English 10B
English 10C
English 30A
English 30B
English 40
English 42
English 43
English 44
English 45
English 46A
English 46B
English 46C
English 105
English 107
English 110A
English 110B
English 111
English 113A
English 113B
English 115
English 117
English 122
English 123
English 125
English 130
English 133
English 137N
English 138
English 139
English 140
English 141
English 142
English 143
English 144
English 146N
English 147
English 149
English 150A
English 150B
English 153
English 155A
English 155B
English 155C
English 156
English 158A
English 158B
English 159
English 160
English 161A
English 161B
English 162
English 164
English 165
English 166
English 167
English 168
English 171A
English 171B
English 173
English 175
English 177
English 178
English 179
English 180
English 181A
English 181B
English 182
English 184
English 185A
English 185B
English 185C
English 186
English 187A
English 189
Entomology 2
Entomology 100
Entomology 100L (course 100 required concurrently)
Entomology 103
Entomology 107
Entomology 109
Entomology 110
Entomology 117
Entomology 119
Entomology 140S
Entomology 153
Entomology 156L (course 156 required concurrently)
Entomology 158
Environmental Horticulture 1
Environ & Resource Science 8

* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.
† Also assigned to another area of topical breadth.
# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Environ & Resource Science 100L (course 100 required concurrently)
Environ & Resource Science 121
Environ & Resource Science 131
Environ Science & Policy 30G (course 30 required concurrently)
Environ Science & Policy 101
Environ Science & Policy 102
Environ Science & Policy 105
Environ Science & Policy 121
Environ Science & Policy 161
Environ Science & Policy 163
Environmental Toxicology 20
Environmental Toxicology 110
Evolution and Ecology 2
Evolution and Ecology 12
Evolution and Ecology 138
Evolution and Ecology 141
Exercise Biology 104L
Fiber And Polymer Science 110
Film Studies 1
Film Studies 120
Film Studies 121
Film Studies 124
Film Studies 125
Film Studies 129
Film Studies 142
Film Studies 176A
Film Studies 176B
Film Studies 189
French 50
French 51
French 52
French 53
Geology 2G (course 2 required concurrently)
Geology 3G (course 3 required concurrently)
Geology 16G
Geology 36
Geology 100
Geology 101
Geology 105
Geology 106
Geology 108
Geology 109L (course 109 required concurrently)
Geology 110
Geology 115
Geology 134
Geology 143
Geology 145
German 40
German 48
German 105
German 112
German 113
German 114
German 115
German 116
German 117
German 118A
German 118B
German 118C
German 119
German 141
German 142
German 176A
Greek 100N
Greek 101
Greek 102
Greek 103A
Greek 103B
Greek 104
Greek 105N
Greek 111
Greek 112
Greek 113
Greek 114
Greek 115
Greek 116
History 3
History 4A
History 4B
History 4C
History 6
History 7A
History 7B
History 7C
History 9A
History 9B
History 10A
History 10B
History 10C
History 15
History 17A
History 17B
History 72A
History 72B
History 102S
History 110
History 111A
History 111B
History 111C
History 112A
History 112B
History 113
History 115A
History 115B
History 115C
History 115D
History 115E
History 115F
History 121A
History 121B
History 121C
History 125
History 130A
History 131B
History 131C
History 132
History 136
History 138A
History 138B
History 138C
History 139A
History 139B
History 141
History 142A
History 142B
History 143
History 144B
History 145
History 146A
History 146B
History 147A
History 147B
History 147C
History 148A
History 148B
History 148C
History 149
History 151A
History 151B
History 151C
History 151D
History 159
History 160
History 162
History 167
History 169A
History 169B
History 170A
History 170B
History 171A
History 171B
History 171D
History 172
History 173
History 174A
History 174B
History 174C
History 175
History 177A
History 177B
History 178A
History 178B
History 179
History 180AN
History 180BN
History 181
History 183A
History 183B
History 184
History 185A
History 185B
History 189
History 190A
History 190B
History 190C
History 190D
History 191A
History 191B
History 191C
History 191D
History 191E
History 191F
History 193A
History 193B
History 194A
History 195B
History 196A
History 196B
Honors Challenge 94
Honors Challenge 194
Human Development 101
Human Development 102
Human Development 117
Human Development 161
Humanities 1D (course 1 required concurrently)
Humanities 3
Humanities 4D (course 4 required concurrently)
Humanities 7
Humanities 8
Humanities 9D (course 9 required concurrently)
Humanities 13
Humanities 15
Humanities 18
Humanities 60
Humanities 144
Humanities 180
Hydrologic Science 10
Integrated Studies 8A
Integrated Studies 8B
Integrated Studies 8C
International Agricultural Dev 10
International Agricultural Dev 162
Italian 50
Italian 105S
Italian 108
Italian 108S
Italian 121
Italian 140
Italian 141
Italian 142
Italian 145
Italian 145S
Italian 150
Japanese 10
Japanese 50
Japanese 101
Japanese 102
Japanese 103
Japanese 104
Japanese 105
Japanese 106
Japanese 107
Japanese 108
Japanese 151
Japanese 152
Japanese 156
Jewish Studies 10
Jewish Studies 101
Jewish Studies 110
Jewish Studies 111
Jewish Studies 112
Jewish Studies 120
Jewish Studies 121
Landscape Architecture 1
Landscape Architecture 2
Landscape Architecture 3
Landscape Architecture 30
Landscape Architecture 168
Latin 100N
Latin 101
Latin 102
Latin 103
Latin 104
Latin 105
Latin 106
Latin 108
Latin 109
Latin 110N
Latin 111
Latin 112
Latin 114
Latin 115
Latin 116
Latin 125
Law 210
Law 210A
Law 286
Law 286C
Law 408A
Linguistics 1
Linguistics 6
Linguistics 141
Linguistics 150
Linguistics 152
Linguistics 160
Linguistics 163
Linguistics 166
Linguistics 180
Linguistics 182
Mathematics 108
Mathematics 189
Med - Public Health Sciences 175W
Medieval Studies 20A
Medieval Studies 20B
Medieval Studies 20C
Medieval Studies 130A
Medieval Studies 130B
Middle East/S. Asian Std 100
Middle East/S. Asian Std 180
Music 10
Music 24A
Music 24B
Music 24C
Music 28
Music 105
Music 106
Music 110A
Music 110B
Music 110C
Music 110D
Music 110E
Music 110F
Music 110G
Music 115
Music 124A
Music 124B
Music 126
Music 129A
Music 129B
Music 129C
Music 129D
Native American Studies 5 *
Native American Studies 10
Native American Studies 46
Native American Studies 55
Native American Studies 108
Native American Studies 115
Native American Studies 120
Native American Studies 122
Native American Studies 130A
Native American Studies 130B
Native American Studies 130C
Native American Studies 133A
Native American Studies 133B
Native American Studies 134
Native American Studies 156
Native American Studies 180
Native American Studies 181A
Native American Studies 181B
Native American Studies 181C
Native American Studies 188
Nature and Culture 1
Nature and Culture 100
Nature and Culture 120
Nature and Culture 130
Nature and Culture 140
Nematology 10V
Nematology 150
Neuro, Physio & Behavior 104L
Neuro, Physio & Behavior 111L
Nutrition 11
Nutrition 114
Nutrition 115
Nutrition 117
Philosophy 1
Philosophy 5
Philosophy 11
Philosophy 13
Philosophy 14
Philosophy 15
Philosophy 17
Philosophy 21
Philosophy 22
Philosophy 24
Philosophy 30
Philosophy 32
Philosophy 38
Philosophy 101
Philosophy 102
Philosophy 103

* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.
† Also assigned to another area of topical breadth.
# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

Philosophy 105
Philosophy 107
Philosophy 108
Philosophy 109
Philosophy 114
Philosophy 115
Philosophy 118
Philosophy 119
Philosophy 123
Philosophy 125
Physics 10
Plant Biology 143
Plant Biology 147
Plant Pathology 140
Plant Science 12
Plant Science 14
Plant Science 130
Plant Science 141
Plant Science 188
Political Science 1
Political Science 2
Political Science 3
Political Science 4
Political Science 5
Political Science 7
Political Science 100
Political Science 102
Political Science 104
Political Science 105
Political Science 106
Political Science 107
Political Science 108
Political Science 109
Political Science 110
Political Science 112
Political Science 113
Political Science 114
Political Science 115
Political Science 116
Political Science 117
Political Science 118A
Political Science 118B
Political Science 118C
Political Science 119
Political Science 120
Political Science 121
Political Science 122
Political Science 123
Political Science 124
Political Science 126
Political Science 129
Political Science 130
Political Science 131
Political Science 132
Political Science 135
Political Science 136
Political Science 137
Political Science 140A
Political Science 140B
Political Science 140C
Political Science 142A
Political Science 142B
Political Science 143A
Political Science 143B
Political Science 144A
Political Science 144B
Political Science 146A
Political Science 146B
Political Science 147A
Political Science 147B
Political Science 147C
Political Science 147D
Political Science 148A
Political Science 148B
Political Science 148C
Political Science 150
Political Science 151
Political Science 152
Political Science 153
Political Science 154
Political Science 155
Political Science 160
Political Science 162
Political Science 163
Political Science 164
Political Science 165
Political Science 168
Political Science 170
Political Science 171
Political Science 172
Political Science 174
Political Science 175
Political Science 176
Political Science 179
Political Science 180
Political Science 183
Political Science 187
Political Science 190
Political Science 192A
Political Science 192B
Political Science 193W
Psychology 129
Psychology 141
Psychology 142
Psychology 158
Psychology 162
Psychology 170
Psychology 175
Psychology 185
Religious Studies 1
Religious Studies 1A
Religious Studies 1B
Religious Studies 1C
Religious Studies 1D
Religious Studies 1E
Religious Studies 1F
Religious Studies 1G
Religious Studies 10
Religious Studies 10A
Religious Studies 21
Religious Studies 23
Religious Studies 30
Religious Studies 40
Religious Studies 42
Religious Studies 60
Religious Studies 65C
Religious Studies 68
Religious Studies 80
Religious Studies 103
Religious Studies 104
Religious Studies 106
Religious Studies 115
Religious Studies 120
Religious Studies 125
Religious Studies 141A
Religious Studies 141B
Religious Studies 141C
Religious Studies 143
Religious Studies 144
Religious Studies 160
Religious Studies 161
Religious Studies 162
Religious Studies 165
Russian 45
Russian 129
Russian 140
Russian 141
Russian 142
Russian 150
Science & Tech Studies 20
Science & Tech Studies 32
Science & Tech Studies 109
Science & Tech Studies 120
Science & Tech Studies 129
Science & Tech Studies 130A
Science & Tech Studies 130B
Science & Tech Studies 131
Science & Tech Studies 150
Science & Tech Studies 161
Science & Tech Studies 164
Science & Tech Studies 165
Science & Tech Studies 173
Science and Society 1
Science and Society 2
Science and Society 3
Science and Society 4
Science and Society 5
Science and Society 7
Science and Society 8
Science and Society 9
Science and Society 10
Science and Society 11
Science and Society 12
Science and Society 15
Science and Society 18
Science and Society 20
Science and Society 25
Science and Society 30
Science and Society 40
Science and Society 120
Science and Society 135S
Science and Society 140
Sociology 2
Sociology 3
Sociology 4
Sociology 5
Sociology 11
Sociology 25
Sociology 100
Sociology 120
Sociology 126
Sociology 127
Sociology 128
Sociology 131
Sociology 134
Sociology 135
Sociology 141
Sociology 143B
Sociology 145A
Sociology 145B
Sociology 146
Sociology 149
Sociology 172
Sociology 181
Soil Science 112
Spanish 147
Spanish 149
Spanish 160
Statistics 10
Textiles & Clothing 7
Textiles & Clothing 107
University Writing Program 1 *
University Writing Program 18 *
University Writing Program 19 *
University Writing Program 101 *
University Writing Program 102A *
University Writing Program 102B *
University Writing Program 102C *
University Writing Program 102D *
University Writing Program 102E *
University Writing Program 102F *
University Writing Program 102G *
University Writing Program 102H
University Writing Program 102I
University Writing Program 102J
University Writing Program 102K
University Writing Program 102L
University Writing Program 104A *
University Writing Program 104B *
University Writing Program 104C *
University Writing Program 104D *
University Writing Program 104E *
University Writing Program 104F *
University Writing Program 104I
University Writing Program 111A
University Writing Program 111B
University Writing Program 111C
Viticulture & Enology 90X
Viticulture & Enology 123L
Washington Center 175
Washington Center 193
Wild, Fish & Conserv Biol 10
Wild, Fish & Conserv Biol 11
Wild, Fish & Conserv Biol 50
Wild, Fish & Conserv Biol 101
Wild, Fish & Conserv Biol 102L
Wild, Fish & Conserv Biol 121
Wild, Fish & Conserv Biol 153
Wild, Fish & Conserv Biol 155
Wild, Fish & Conserv Biol 156
Women's Studies 20
Women's Studies 25
Women's Studies 50
Women's Studies 60
Women's Studies 136
Women's Studies 137
Women's Studies 138
Women's Studies 139
Women's Studies 170
Women's Studies 178A
Women's Studies 178B
Women's Studies 178C
Women's Studies 178D
Women's Studies 178E
Women's Studies 178F
Women's Studies 179
Women's Studies 182
Women's Studies 184
Women's Studies 191

* This course may not be used to satisfy a college or university composition requirement and GE writing experience simultaneously.
† Also assigned to another area of topical breadth.
# Credit for writing experience allowed if co-course taken concurrently (see writing experience list).

GENERAL EDUCATION THEME OPTIONS

The following section pertains to students who matriculated to UC Davis **prior** to Fall 2011. Students who matriculate for the first time in Fall 2011, or later, should refer to the Revised General Education Requirement.

General Education theme options are sets of GE courses sharing a common intellectual theme. These GE theme options are not a separate element of the GE requirement, but a way of selecting your GE courses so that you may benefit from a coherent focus of study while completing the GE requirement. Completion of a theme satisfies the GE requirement for students with majors assigned to the GE topical breadth area of Arts and Humanities. Students with majors assigned to the topical breadth area of either Science and Engineering or Social Science will need to complete additional GE courses in Arts and Humanities to satisfy the campus GE requirement.

Global Population and Environmental Issues

For centuries, there have been concerns and predictions about population growth and its potential effects on the environment and the quality of life. Perspectives on population and environmental issues often vary based on such factors as gender, social class, culture, nation, race/ethnicity, and religion. In this group of courses, students will learn about the complex interplay among environmental, economic, and ethical issues through the study of global population patterns. They will learn how science addresses the use of natural resources by humans, along with the fundamentals of environmental impacts such as global warming. This option group of courses explores diverse perspectives on global population and environmental issues by examining biological, physical, and social processes that influence the everyday lives of people around the world.

Topics might include the social, economic, and environmental challenges of population growth; and the ethics and dilemmas of natural resource use.

Global Population	
Atmospheric Science 5 [or 10]	SciEng, Wrt
Human Development 117	SciEng, Wrt
Agricultural and Resource Economics 15	SocSci, Div, Wrt
Science and Society 1	SciEng or SocSci, Div, Wrt
[or Fiber and Polymer Science 110	SciEng or SocSci, Wrt]
International Agricultural Development 10,	SocSci, Div, Wrt
[or Community & Regional Development 1	SocSci, Div, Wrt]

Biodiversity and Cultural Diversity

The nations with the greatest biodiversity often have tremendous ethnic and cultural diversity. This option examines diversity in many interrelated contexts: biological diversity and the impact of contemporary humans; values and cultural practices in regard to production and consumption; the clothes people wear; creation and use of social spaces; and the preservation of genetic resources for food, fiber, and pharmaceuticals.

Topics might include conservation biology; integration of human and natural systems; cultural expression through clothing and appearance; and discussion of what are cultural and social rights.

Biodiversity and Cultural Diversity	
Wildlife, Fish and Conservation Biology 10	SciEng, Div, Wrt
Plant Biology 11	SciEng, Wrt
Textiles and Clothing 7	SocSci, Div, Wrt
Community and Regional Development 2	SocSci, Div, Wrt
Landscape Architecture 2	SocSci, Wrt

Food and Fiber

This option focuses on food and fiber systems, from their plant, animal, or synthetic sources to their ultimate use by humans for health, safety, communication, and pleasure. Understanding these systems enables students to see the connections between the food and clothes that are part of our everyday lives and the scientific, social, and cultural issues that make them so significant to society as a whole.

Topics might include food and clothing safety, quality, and availability; media and consumer perceptions; and cultural histories, values, and meanings.

Food and Fiber	
Animal Science 1	SciEng, Wrt
[or Plant Biology 12	SciEng, Div, Wrt]
Nutrition 10	SciEng
and Nutrition 11	SciEng, Wrt
[or Food Science and Technology 10	SciEng or SocSci]
Textiles and Clothing 6	SciEng
Textiles and Clothing 7 or 107	SocSci, Div, Wrt
Science and Society 1	SciEng or SocSci, Div, Wrt
Viticulture and Enology 3	SciEng or SocSci

Changing Agriculture

Changing demographics, environmental issues, and social-political trends in California all play a role in public perceptions and policies related to our food and fiber systems, natural resources, and community values. These perceptions, policies, and values need to be critically examined in the context of larger global economic trends and environmental health and safety. In this option group of courses, students can explore a range of challenging issues related to the complex interplay between rural and urban needs and values.

Topics might include holistic approaches to agriculture; international migration and agricultural development; and how plants and animals influence the course of history.

Changing Agriculture Theme Option	
Animal Science 1	SciEng, Wrt
Entomology 110	SciEng, Wrt
Plant Biology 12	SciEng, Div, Wrt
Agricultural and Resource Economics 15	SocSci, Div, Wrt
Environmental & Resource Sciences 121*	SciEng, Wrt
Science and Society 2	SciEng or SocSci, Wrt

APPENDIX

RESIDENCE FOR TUITION INFORMATION

Policy Governing Residence

The rules regarding residence for tuition purposes at the University of California are governed by the California Education Code and implemented by Standing Orders of the Regents of the University of California. Under these rules, adult citizens and certain classes of aliens can establish residence for tuition purposes. There are particular rules that apply to the residence classification of minors. The UC regulations establish the residence determination date for each term as the day instruction begins at the last of the University of California campuses to open for the quarter, and for schools on the semester system, the day instruction begins for the semester. All of the UC requirements for residency must be met prior to the residence determination date for classification as a resident. Documentary evidence may be required and all relevant indications will be considered in determining residence classifications.

You are cautioned that this summary is not a complete explanation of the regulations regarding residence. Please note that changes may be made in the residence requirements between the publication of this statement and the relevant residence determination date.

See Requirements for Resident Classification—Who is a Resident?, below. See also General Rules Applying to Minors, on page 553 and Specific Rules Applying to Minors, on page 553.

Resident Determination Process

California residence for tuition purposes is determined for each student under regulations established by the UC Office of the General Counsel based on information provided to a campus Residence Deputy on the Statement of Legal Residence. Additional information and documentation in support of your claim of resident status for tuition purposes may be requested as needed.

Requirements for Resident Classification—Who is a Resident?

If you are an adult student (18 years of age or older) you may establish residence for tuition purposes in California if: *(1)* you are a U.S. citizen; *(2)* you are a permanent resident or other immigrant; or *(3)* you are a nonimmigrant who is not precluded from establishing a domicile in the U.S. Nonimmigrants who are not precluded from establishing a domicile in the U.S. include those who hold visas of the following types: A, E, G, H-1, H-4, I, K, L, N, NATO, O-1, O-3, R, or V. To establish residence you must be physically present in California for more than one year and you must have come here with the intent to make California your home as opposed to coming to this state to go to school. Physical presence within the state solely for educational purposes does not constitute the establishment of California residence, regardless of the length of your stay. You must demonstrate your intention to make California your home by severing your residential ties with your former state of residence and establishing those ties with California. Evidence of intent must be dated one year before the term for which you seek resident classification. If these steps are delayed, the one-year durational period will be extended until you have demonstrated both presence and intent for one full year. If your parents do not meet the University's requirements for residence for tuition purposes, you are required to be financially independent and completely self-supporting in order to be a resident for tuition purposes. Evidence of your self-support must be dated from two years before the term for which you seek resident classification; see Requirement for Financial Independence, on page 553.

Your residence cannot be derived from your spouse, registered domestic partner, or your parents.

Eligibility and Proof of Status

Proof of citizenship is typically required only to resolve discrepancies on campus records for residency and Financial Aid purposes. Immigrants are required to present copy of current, valid permanent resident card (greencard) or documents to verify other immigration or pending immigration status. Nonimmigrant Visa holders are required to present verification of their current, valid visa, or prior visa documents. Noncitizens, including International Students, whose visa or immigration status changes must notify the Residence Deputy immediately and are subject to a review of their residency status and reclassification.

Establishing Intent to Become a California Resident

Indications of your intent to make California your permanent residence can include the following: registering to vote and voting in California elections; designating California as your permanent address on all school and employment records, including military records if you are in the military service; obtaining a California driver's license or, if you do not drive, a California Identification Card; obtaining California vehicle registration; paying California income taxes as a resident, including taxes on income earned outside California from the date you establish residence; establishing a California residence in which you keep your personal belongings; and licensing for professional practice in California. The absence of these indicia in other states during any period for which you claim residence can also serve as an indication of your intent. Documentary evidence is required and all relevant indications will be considered in determining your classification. Your intent will be questioned if you return to your prior state of residence when the University is not in session.

Temporary Absence

If you are a nonresident student who is in the process of establishing a residence for tuition purposes and you return to your former home during non-instructional periods, your presence in the state will be presumed to be solely for educational purposes and only convincing evidence to the contrary will rebut this presumption; a student who is in the state solely for educational purposes will NOT be classified as a resident for tuition purposes regardless of the length of his or her stay. If you are a student who has been classified as a resident for tuition purposes and you leave the state temporarily, your absence could result in the loss of your California residence. The burden will be on you (or your parents if you are a minor) to verify that you did nothing inconsistent with your claim of a continuing California residence during your absence. Steps that you (or your parents) should take to retain a California residence include:

1. Continue to use a California permanent address on all records; educational, employment, military, etc.

2. Satisfy California resident income tax obligations. Note: If you are claiming California residence, you are liable for payment of income taxes on your total income from the date you establish California residence. This includes income earned in another state or country.
3. Retain your California voter's registration and vote by absentee ballot.
4. Maintain a California driver's license and vehicle registration. If it is necessary to change your driver's license and/or vehicle registration while you are temporarily residing in another state, you must change them back to California within the time prescribed by law.
5. Maintain active bank accounts.

Requirement for Financial Independence

You will be considered "financially independent" if one or more of the following applies: *(1)* you are at least 24 years of age by December 31 of the calendar year for which you are requesting resident classification; *(2)* you are a veteran of the U.S. Armed Forces; *(3)* you are a ward of the court or both parents are deceased; *(4)* you have children or other legal dependents other than a spouse or registered domestic partner; *(5)* you are married or in a registered domestic partnership, or a graduate student or a professional student, and you were not claimed as an income tax deduction by your parents or any other individual for the tax year immediately preceding the term for which you are requesting resident classification; or *(6)* you are a single undergraduate student and you were not claimed as an income tax deduction by your parents or any other individual for the two tax years immediately preceding the term for which you are requesting resident classification, and you can demonstrate self-sufficiency for those years and the current year.

Note: Graduate or professional school students who are employed at UC Davis 49% or more (or awarded the equivalent in University-administered funds; e.g., fellowships, grants, stipends) during the term for which classification as a resident is requested are exempt from the financial independence requirement.

Tuition Fee for Nonresident Students

If you have not been living in California with intent to make it your permanent home for more than one year immediately before the residence determination date for each term in which you propose to attend the University, you must pay a nonresident tuition fee in addition to all other fees.

Appeals

Any student, following a final decision on residence classification by the Residence Deputy, may appeal in writing to the Residence Specialist—Office of the General Counsel, 1111 Franklin St., 8th Floor, Oakland, CA, 94607-5200 within 30 days of notification of the Residence Deputy's final decision. Remember, applicants and students are responsible for submitting ALL RELEVANT DOCUMENTATION AND INFORMATION to the campus Residence Deputy in support of their in-state residency request. Information or documents requested but not made available to the Residence Deputy will be considered or reviewed on appeal.

Petitions for Classification to Resident Status

If you were classified as a non-resident as a new student and feel you now meet the UC's residency requirements and you wish to be classified as a resident, you should file your petition at least three weeks before the first day of instruction for the quarter for which you seek resident status. Late petitions will not be accepted. Incomplete petitions will be returned. If additional documentation is required for reclassification but is not readily accessible, you will be allowed until the end of the applicable term to provide it.

Incorrect Classification

If you were incorrectly classified as a resident, you are subject to reclassification and to payment of all nonresident tuition fees not paid. If you concealed information or furnished false information and were classified incorrectly as a result, you are also subject to University discipline. Resident students who become nonresidents must immediately notify the campus residence deputy.

General Rules Applying to Minors

If you are an unmarried minor (under age 18), the residence of the parent with whom you live is considered to be your residence. If you have a parent living, you cannot change your residence by your own act, by the appointment of a legal guardian, or by the relinquishment of your parent's right of control. If you lived with neither parent, your residence is that of the parent with whom you last lived. Unless you are a minor alien present in the U.S. under the terms of a nonimmigrant visa which precludes you from establishing domicile in the U.S., you may establish your own residence when both your parents are deceased and a legal guardian has not been appointed. If you derive California residence from a parent, that parent must satisfy the one-year durational residence requirement.

Specific Rules Applying to Minors

- **Deceased Parents.** You may establish your own residence if both of your parents are deceased and a legal guardian has not been appointed for you.
- **Divorced/Separated Parents**. You may be able to derive California resident status from a California resident parent if you move to California to live with that parent on or before your 18th birthday. If you begin residing with your California parent after your 18th birthday, you will be treated like any other adult student coming to California to establish residence.
- **Parent of Minor Moves From California.** You may be entitled to resident status if you are a minor U.S. citizen or eligible alien whose parent(s) was a resident of California who left that state within one year of the residence determination date if: *(1)* you remained in California after your parent(s) departed; *(2)* you enroll in a California public postsecondary institution within one year of the time your parent(s) depart and establish residence elsewhere; and *(3)* once enrolled, you maintain continuous attendance in that institution. Financial independence will not be required in this case.
- **Self-Support**. You may be entitled to resident status if you are a U.S. citizen or eligible alien, a minor, and can prove the following: *(1)* you lived in California for the entire year immediately preceding the residence determination date; *(2)* you are self-supporting and were self supporting the entire year preceding the residence determination date; and *(3)* you intend to make California your permanent home.

• **Two-Year Care and Control.** You may be entitled to resident status if you are a U.S. citizen or eligible alien and you have lived continuously with an adult who is not your parent for at least two years prior to the residence determination date. The adult with whom you are living must have been responsible for your care and control for the entire two-year period and must have been residing in California during the one year immediately preceding the residence determination date.

Exemptions from Nonresident Tuition

• **Member of the Military.** If you are a member of the U.S. military stationed in California on active duty, unless you are assigned for educational purposes to a state-supported institution of higher education, you may be exempt from the nonresident tuition fee. You must provide the residence deputy on campus with a copy of your current orders as well as a statement from your commanding officer or personnel officer stating that your assignment to active duty in California is not for educational purposes. The letter must include the dates of your assignment to the state.

• **Spouse, Registered Domestic Partner, or Other Dependents of Military Personnel.** You are exempt from payment of the nonresident tuition fee if you are a spouse, a registered domestic partner, a natural or adopted child or stepchild who is a dependent of a member of the U.S. military stationed in California on active duty. If you are enrolled in an educational institution and the member of the military is transferred on military orders to a place outside California where he or she continues to serve in the armed forces, or the member of the military retires from active duty immediately after having served in California on active duty, you may retain this exemption.

• **Child, Spouse, or Registered Domestic Partner of Faculty Member.** To the extent funds are available, if you are an unmarried dependent child under age 21 the spouse, or the registered domestic partner of a member of the University faculty who is a member of the Academic Senate, you may be eligible for a waiver of the nonresident tuition fee. Confirmation of the faculty member's membership on the Academic Senate must be secured each term this waiver is granted.

• **University Employment Outside of California.** You may be entitled to resident classification if you are a full-time University employee, or the unmarried dependent child, the spouse, or the registered domestic partner of a full-time University employee who is assigned to work outside of the state of California (e.g., Los Alamos National Laboratory and the University of California Washington D.C. Center). The University employee's employment status must be ascertained each term.

• **Child, Stepchild, Spouse, or Registered Domestic Partner of Deceased Public Law Enforcement or Fire Suppression Employee.** You may be entitled to a waiver of the nonresident tuition fee if you are the child, the stepchild, the spouse, or the registered domestic partner of a deceased public law enforcement or fire suppression employee who was a California resident at the time of his or her death and who was killed in the course of fire suppression or law enforcement duties.

• **Dependent Child of a California Resident.** A student who has not been an adult resident of California for more than one year and who is the dependent child of a California resident who has been a resident for more than one year immediately prior to the residence determination date may be entitled to resident classification until the student has resided in California for the minimum time necessary to become a resident so long as continuous attendance is maintained at an institution.

• **Native American Graduate of BIA School.** You are eligible for an exemption from the nonresident fee if you are a graduate of a California school operated by the Federal Bureau of Indian Affairs and you enroll at one of the University of California campuses. Currently, Sherman Indian High School in Riverside is the only California high school operated by the BIA.

• **Employee of a California Public School District.** A student holding a valid credential authorizing service in California public schools and employed by a school district in a full-time certificate position may be exempt from nonresident tuition.

• **Student Athlete in Training at U.S. Olympic Training Center, Chula Vista.** An amateur athlete in training at the U.S. Olympic Training Center in Chula Vista may be exempt from nonresident tuition until s/he has resided in California for the minimum time necessary to become a resident.

• **Graduate of California High School.** A student who attended high school in California for three or more years (9th grade included) and graduated from a California high school (or attained the equivalent) may be exempt from nonresident tuition.

• **Surviving Spouse, Registered Domestic Partner, or Dependent Child of a California Resident Killed in the September 11, 2001 Terrorist Attacks.** An undergraduate student who is the surviving spouse, registered domestic partner, or dependent child of a California resident killed in the September 11, 2001 terrorist attacks on the World Trade Center, the Pentagon Building or the crash of United Airlines Flight 93, may be exempt from nonresident tuition and mandatory system-wide fees. Eligible students must meet the financial need requirements for the Cal Grant A program.

• **Recipient of a Congressional Medal of Honor or the Child of a Recipient of the Congressional Medal of Honor.** An undergraduate student who is a recipient of a Congressional Medal of Honor or who is the child of a recipient of the Congressional Medal of Honor may be exempt from nonresident tuition and mandatory system-wide fees. The recipient of the Medal of Honor must be a California resident or must have been a California resident at the time of his or her death. The student may not be older than 27 and the student's annual income may not exceed the national poverty level.

Inquiries

Inquiries regarding residence requirements, determination, classification and /or recognized exceptions should be directed to Residence Deputy, Office of the University Registrar, One Shields Avenue, Davis, California 95616 or *residencedeputy@ucdavis.edu*. Inquiries regarding UC Residence Policy or appeals should be directed to: Residency Analyst, University of California, Office of the General Counsel, 1111 Franklin St., 8th Floor, Oakland, CA 95607 (510) 987-9980. NO OTHER UNIVERSITY PERSONNEL ARE AUTHORIZED TO PROVIDE INFORMATION REGARDING RESIDENCE REQUIREMENTS.

UNIVERSITY POLICY ON NONDISCRIMINATION, SEXUAL HARASSMENT, DISABILITY ACCOMMODATIONS, STUDENT RECORDS AND PRIVACY

Nondiscrimination. The University of California, in accordance with applicable Federal and State law and University policy, does not discriminate on the basis of race, color, national origin, religion, sex, gender identity, pregnancy (including childbirth and related medical conditions), physical or mental disability, age, medical condition (cancer-related or genetic characteristics), ancestry, marital status, citizenship, sexual orientation, or service in the uniformed services (includes membership, application for membership, performance of service, application for service, or obligation for service in the uniformed services). The University also prohibits sexual harassment. This nondiscrimination policy covers admission, access, and treatment in University programs and activities.

Inquiries regarding the University's student-related nondiscrimination policies may be directed to the Director, Student Judicial Affairs (530) 752-1128 or the UC Davis Compliance Director (ADA and Title IX Officer) (530) 752-9466. Students are encouraged to seek assistance as soon as possible, as time limits apply to some grievance processes.

Campus policies provide for a prompt and effective response to student complaints. This response may include early resolution procedures such as administrative review or investigation. The student will be informed of the results of the review.

Sexual Harassment. Sexual harassment is prohibited by law and by university policy and will not be condoned. Campus Policy (PPM Section 380-12 at *http://manuals.ucdavis.edu/ppm/380/380-12.htm*).

The Sexual Harassment Education Program (530) 752-9255 works with students to resolve complaints of sexual harassment and provides students with referrals to other campus resources that can provide assistance. Students may report sexual harassment to deans, supervisors, managers, the Campus Sexual Harassment Officer (Director of the Sexual Harassment Education Program) and other campus officials, including Student Judicial Affairs and Student Housing, and the Compliance Director (Title IX Officer). With the exception of certain confidential resources, University officials receiving a report of sexual harassment must immediately consult with the Sexual Harassment Officer. Students may seek confidential advice and support from Counseling & Psychological Services (530) 752-0871; the Campus Violence Prevention Program (530) 752-3299; the Lesbian, Gay, Bisexual and Transgender Resource Center (530) 752-2452; and the Women's Resources and Research Center (530) 752-3372. Consultation with these resources will not lead to a report of sexual harassment unless additional action is taken by the individual seeking advice.

Accommodations for Students with Disabilities. Students with documented disabilities may be entitled to academic accommodations to gain access to the University's academic programs. More information about academic accommodations can be obtained by contacting the Student Disability Center at *http://sdc.ucdavis.edu* or (530) 752-3184.

Disclosures from Student Records. Students have the right to review records that relate to themselves in their capacity as students and to request corrections of records that are inaccurate. Most disclosures from student records to outside parties require prior consent from the student.

Under the Family Educational Rights and Privacy Act of 1974 and University and campus policies, UC Davis students have the following rights:

- To review their own student records within 45 days after the student submits a written request for access to the Registrar or other department having possession of the records to be reviewed. That office will make arrangements for access and notify the student when and where the records may be reviewed. If the records are maintained by a different office, the request will be redirected and the student notified. The campus maintains several types of student records in various locations. Questions about how to obtain records should be referred to Student Judicial Affairs at (530) 752-1128.
- To request amendment of their own student records if they believe the records are inaccurate or misleading. Students should submit a written request to the office that maintains the records specifying the portion of the record the student wants changed and why it is believed to be inaccurate or misleading. That office has 45 days to determine whether the record should be changed and notify the student of the decision, including of the right to a hearing and hearing procedures.
- To restrict the disclosure of personally identifiable information contained in student records, except when law and policy permit disclosure without consent. Examples of circumstances in which the student's consent is not required for disclosure of student records include the following:

  1. Disclosure of "directory" or "public" information including the student's name; local and/or permanent address(es), e-mail addresses and telephone number(s); dates of attendance; major field(s) of study major, minor, concentration, specialization, and similar designations; grade level; enrollment status (undergraduate/graduate. Full or part time); number of enrolled course units; degrees and honors received; most recent previous educational institution attended; participation in officially recognized activities, including intercollegiate athletics, and the name, weight and height of participants on ICA teams. Such information may be published in a student directory.

     a. To prevent disclosures of telephone numbers and/or addresses, students must submit a written request to the Registrar by the tenth day of instruction. To prevent disclosure of their e-mail address, students must follow instructions at *https://computingaccounts.ucdavis.edu/*, and then select "*Change your directory information*."

  2. Disclosure to campus officials (for example faculty, staff, student employees, or those under contract with the University) having a legitimate educational interest in the records. Legitimate educational interest means the information is relevant and necessary to a task or determination that is *(a)* an employment responsibility or an assigned subject matter for the inquirer and/or related to *(b)* the inquirer's participation in the student's education; *(c)* the discipline of a student; or *(d)* providing a service or benefit related to a student or student's family (such as health care, counseling, job placement, or financial aid).

Parental/guardian information is confidential. It is used by UC Davis only for notification of events, ceremonies, awards and development or in case of an emergency involving the student.

For more information, see University of California Policies Applying to Disclosure of Information from Student records and UC Davis Policy and Procedure Manual Section 320-21.

Questions about these rights and requirements should be referred to Student Judicial Affairs (530) 752-1128. Students can file complaints regarding alleged violations of privacy rights with the Office of Student Judicial Affairs. Students may also contact the U.S. Department of Education concerning alleged violations of these requirements, addressed to the Family Policy Compliance Office, U.S. Department of Education, 400 Maryland Avenue, SW., Washington, DC 20202-4605. See section 99.63 at *http://www.ed.gov/policy/gen/guid/fpco/ferpa/index.html*.

Social Security Numbers. A student's Social Security number is used to verify personal identity in the UC Davis Student Records System. Disclosure of social security number is mandatory. In compliance with state law, Social security numbers are confidential and are not used as student identifiers.

CAMPUS SECURITY, CRIME AWARENESS, AND ALCOHOL AND DRUG ABUSE PREVENTION

In accordance with federal law, UC Davis annually provides students and employees with information regarding campus security, crime statistics, and alcohol and drug abuse prevention, pursuant to the Student Right to Know and Campus Security Act of 1990 and the Drug Free Schools Act of 1989. The UC Davis Police and Campus Administration make continual efforts to reduce crime on campus. A well-informed community is better served and safer.

For a copy of the complete UC Davis security and crime prevention report, including crime statistics, campus security measures and crime reporting procedures, applicants for admission or prospective employees may contact the UC Davis Campus Violence Prevention Office, located in the UC Davis Police Department, contact (530) 752-3299, or *jxsouza@ucdavis.edu*.

ACCREDITATION

The University of California, Davis is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges, 985 Atlantic Avenue, Suite 100, Alameda, CA 94501 (510) 748-9001, an institutional accrediting body recognized by the Council for Higher Education and the U.S. Department of Education.

UC Davis is also accredited by the, Accreditation Board for Engineering and Technology, Accreditation Council for Graduate Medical Education, American Assembly of Collegiate Schools of Business, American Association for Accreditation of Laboratory Animal Care, American Bar Association, American Chemical Society, American Dietetic Association, American Society of Landscape Architects, Association of American Law Schools, Association of American Medical Colleges, Commission of Teacher Credentialing, Computer Science Accreditation Commission, Council on Education and Public Health, the Council on Education of the American Veterinary Medical Association, and the Liaison Committee on Medical Education.

Students interested in reviewing the accreditation documents may do so by scheduling an appointment with the Office of the Provost in Mrak Hall.

THE BOARD OF REGENTS

Governance of the University is entrusted to a corporation called The Board of Regents. Of the individuals composing the board, 18 are California citizens appointed by the governor; and seven, including the president of the University and the governor of California, serve ex officio. A Student Regent is selected each year from a list of names submitted to the board by the Student Body Presidents' Council.

The Regents have delegated authority in academic matters to the Academic Senate of the faculty, which determines academic policy and supervises the instructional activities of the entire University. All of the permanent faculty, as well as key administrators, are members of the Senate.

The Regents have delegated authority for the organization of the University to the president. Mark G. Yudof is President and head of the Universitywide administration. Authority for the administration of each campus has been delegated to a chancellor.

THE REGENTS OF THE UNIVERSITY OF CALIFORNIA

Regents Ex Officio

Arnold Schwarzenegger
Governor of California and President of the Regents

Karen Bass
Speaker of the Assembly

Jack O'Connell
State Superintendent of Public Instruction

Ronald W. Stovitz
President of the Alumni Associations of the University of California

Yolanda Nunn Gorman
Vice President of the Alumni Associations of the University of California

Mark G. Yudof
President of the University

Appointed Regents

Current term expires on March 1 of year indicated.
Richard C. Blum, 2014
William De La Pena, 2018
Russell Gould, 2017
Eddie Island, 2017
Odessa P. Johnson, 2012
George Kieffer, 2021
Joanne C. Kozberg, 2010
Sherry L. Lansing, 2010
Monica Lozano, 2013
Hadi Makarechian, 2020
George M. Marcus, 2012
Norman J. Pattiz, 2014
Bonnie Reiss, 2020
Frederick Ruiz, 2016
Leslie Tang Schilling, 2013
Bruce D. Varner, 2018
Paul Watcher, 2016
Charlene Zettel, 2021
Jesse Bernal, June 30, 2010
Student Regent

Harry Powell, August 31, 2010
Faculty Representative

Dan Simmons, August 31, 2011
Faculty Representative

Principal Officers of the Regents

Charles F. Robinson
General Counsel

Marie N. Berggren
Acting Treasurer

Diane Griffiths
Secretary

Sheryl Vacca
Chief Compliance and Audit Officer

ADMINISTRATIVE OFFICERS OF THE UNIVERSITY

Mark G. Yudof
President of the University

Lawrence Pitts
Interim Provost and Executive Vice President—Academic Affairs

Nathan Brostrom
Executive Vice President—Business Operations

Bruce B. Darling
Executive Vice President—University Affairs

Peter J. Taylor
Executive Vice President—Chief Financial Officer

Daniel M. Dooley
Senior Vice President—External Relations and Vice President—Agriculture and Natural Resources

Patrick J. Lenz
Vice President—Budget

John D. Stobo
Senior Vice President—Health Sciences and Services

Judy Sakaki
Vice President—Student Affairs

Anne C. Broome
Vice President—Finance

Robert L. Van Ness
Associate Vice President—Laboratory Operations

Glenn L. Mara
Associate Vice President—Laboratory Programs

Steven V.W. Beckwith
Vice President—Research and Graduate Studies

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Chancellor at Berkeley

Linda P.B. Katehi
Chancellor at Davis

Michael V. Drake
Chancellor at Irvine

Gene D. Block
Chancellor at Los Angeles

Sung-Mo "Steve" Kang
Chancellor at Merced

Timothy P. White
Chancellor at Riverside

Marye Anne Fox
Acting Chancellor at San Diego

Susan Desmond-Hellmann
Chancellor at San Francisco

Henry T. Y. Yang
Chancellor at Santa Barbara

George W. Blumenthal
Chancellor at Santa Cruz

ADMINISTRATIVE OFFICERS—UC DAVIS

Chancellor

Linda P.B. Katehi, Ph.D.

Chancellor Emeriti (and years served)

Larry N. Vanderhoef, Ph.D. (1994-2009)
Theodore L. Hullar, Ph.D. (1987-1994)

Vice Chancellors

Enrique J. Lavernia, Ph.D.
Provost and Executive Vice Chancellor

Barry M. Klein, Ph.D.
Vice Chancellor—Research

John Meyer, M.P.A.
Vice Chancellor—Administrative and Resource Management

Claire Pomeroy, M.D., M.B.A.
Vice Chancellor-Human Health Sciences

Beverly "Babs" Sandeen, Ph.D.
Vice Chancellor-University Relations

Fred E. Wood, Ph.D.
Vice Chancellor-Student Affairs

Vice Provosts

Barbara A. Horwitz, Ph.D.
Vice Provost-Academic Personnel

William B. Lacy, Ph.D.
Vice Provost-University Outreach and International Programs

Peter M. Siegel, M.A.
Vice Provost-Information and Educational Technology

Patricia A. Turner, Ph.D.
Vice Provost-Undergraduate Studies

Associate Chancellor

Maril R. Stratton, M.A.

Associate/Assistant Vice Chancellors

Rahim Reed, M.P.A., J.D.
Associate Executive Vice Chancellor-Campus Community Relations

Janet C. Gong, Ed.D.
Senior Associate Vice Chancellor-Student Affairs

J. Michael Allred, M.B.A.
Associate Vice Chancellor-Finance/Controller

Jill Parker, B.S.
Associate Vice Chancellor-Administrative and Resource Management (Safety Services)

Lora Jo Bossio, M.A.
Interim Associate Vice Chancellor-Student Affairs (Enrollment and Academic Support Services)

Jean-Xavier Guinard, Ph.D.
Associate Vice Provost-University Outreach and International Programs (International Programs)

Jacquelyn Gervay Hague, Ph.D.
Associate Vice Provost-University Outreach and International Programs (University Outreach and Engagement)

Bernd Hamann, Ph.D.
Associate Vice Chancellor-Research (Interdisciplinary Research Administration and Academic Personnel)

Karen Slakey Hull, M.B.A.
Associate Vice Chancellor-Administrative and Resource Management (Human Resources)

Cheryl Brown Lohse, M.S.
Associate Vice Chancellor-University Relations (Development)

Kelly Ratliff, M.B.A.
Associate Vice Chancellor-Administrative and Resource Management (Budget and Institutional Analysis)

Heather Young, Ph.D., R.N., F.A.A.N.
Associate Vice Chancellor-Betty Irene Moore School of Nursing

Robert I. Loessberg-Zahl, M.P.P.
Assistant Executive Vice Chancellor

Mitchel Benson, M.S.J.
Assistant Vice Chancellor-University Relations (University

Communications)

Griselda Castro, M.A.
Assistant Vice Chancellor-Student Affairs (Student Life)

Diane Davies-Conley, C.P.A., M.B.A.
Assistant Vice Chancellor-Administrative and Resource Management (Chief Operating Officer)

Marjorie M. Dickinson, B.A.
Assistant Vice Chancellor-University Relations (Government and Community Relations)

Richard Engel, M.A.
Assistant Vice Chancellor-University Relations (Alumni Relations/Executive Director, Cal Aggie Alumni Association)

Sid England, Ph.D.
Assistant Vice Chancellor-Administrative and Resource Management (Environmental Stewardship and Sustainability)

Clayton Halliday, A.I.A.
Assistant Vice Chancellor-Administrative and Resource Management (Design and Construction Management)

Leslye Hays
Assistant Vice Chancellor-Research (Business and Administration)

Robert Kerr, Ph.D.
Assistant Vice Provost-University Outreach and International Programs (International Alumni and Development)

Karl Mohr, M.A.
Assistant Vice Chancellor-Administrative and Resource Management (Capital Resource Management)

Robert Segar, M.L.A.
Assistant Vice Chancellor-Administrative and Resource Management (Campus Planning and Community Resources)

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Interim Director, Financial Aid

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Director, Student Housing

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James MacDonald, Ph.D., Executive Associate Dean
Jan Hopmans, Ph.D., Associate Dean
Mary Delany, Ph.D., Associate Dean
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James E. Hill, Ph.D., Associate Dean—International Programs

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Karen McDonald, Ph.D., Associate Dean—Research and Graduate Studies
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Sharon Pinkney, Assistant Dean—Admission & Enrollment)
Adam Talley, Assistant Dean—Administration

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Ian Gardner, B.S., M.P.V.M., Ph.D., Co-Director—Masters of Preventive Veterinary Medicine Program
Bruno Chomel, D.V.M., M.S., Ph.D., Co-Director—Masters of Preventive Veterinary Medicine Program

UC Davis Extension

Dennis Pendleton, Ph.D., Dean

PROPORTION OF UC DAVIS GRADUATES FINDING WORK IN THEIR FIELDS OF CHOICE [1]

The percent of alumni whose full-time job is in the field of their choice is shown by field of study. Figures do not include the 15 percent of graduates who had not decided on a career field at the time of the survey.

Field of Study[2]**,** Percentage finding work in field of choice

Agricultural Sciences, 85%
Biological Sciences, 68%
Engineering, 81%
Environmental Sciences, 84%
Humanities, Arts and Cultural Studies, 71%
Human Sciences, 71%
Mathematical and Physical Sciences, 80%
Social Sciences, 63%

Total, 71%

[1]Source: A 2006 survey of June 2004-05 graduates conducted by Student Affairs Research and Information.
[2]Fields of Study are groups of related undergraduate majors as organized into UC Davis colleges or divisions.

RETENTION DATA AND GRADUATION RATES AT UC DAVIS

Freshmen*

(Retention and graduation rates through Summer 2006 for all undergraduates entering UC Davis as freshmen.)

Fall Quarter of Initial Enrollment:	Number of Students**	Percent Enrolled One Year	Percent Graduating in Four Years	Percent Graduating in Five Years	Percent Graduating in Six Years
1993	3,114	90.6%	29.8%	67.9%	76.6%
1994	3,182	89.2%	30.5%	65.6%	73.4%
1995	3,245	88.8%	31.7%	68.4%	75.3%
1996	3,685	91.1%	37.6%	72.6%	79.2%
1997	3,526	89.7%	37.6%	71.0%	77.8%
1998	3,616	89.6%	38.7%	72.2%	78.4%
1999	3,817	90.1%	42.0%	74.7%	79.9%
2000	4,319	90.3%	42.7%	75.9%	80.9%

Transfer Students

(Retention and graduation rates through Spring 2006 for all undergraduates transferring to UC Davis as juniors.)

Fall Quarter of Initial Enrollment:	Number of Students**	Percent Enrolled One Year	Percent Graduating in Two Years	Percent Graduating in Three Years	Percent Graduating in Four Years
1993	1,414	88.4%	28.1%	66.4%	77.4%
1994	1,691	88.4%	29.7%	66.2%	76.2%
1995	1,749	85.5%	29.6%	64.8%	75.9%
1996	1,638	86.6%	30.7%	68.1%	77.7%
1997	1,634	85.1%	30.8%	67.9%	76.3%
1998	1,545	88.3%	36.4%	72.0%	80.1%
1999	1,394	89.5%	41.5%	74.0%	81.7%
2000	1,777	89.4%	38.4%	73.2%	83.6%

Retention is defined as enrollment at the third week census point of the fall term one year from initial fall term.

Graduation is define as having received degree from UC Davis (does not include students who transferred to another institution to complete their degree).

*Retention and graduation tracking limited to students enrolled full-time in their initial term of enrollment.

**Students excluded from these counts include those who are now deceased or participated in any of the following: Military Service, Foreign Service, Religious Mission.

Source: Student Affairs Research & Information, UC Davis (March 23, 2007)

AVERAGE YEARLY SALARY OFFERED TO GRADUATES WITH BACHELOR'S, MASTER'S, AND DOCTORATE DEGREES [1]

Field of Study:	Average Yearly Salary		
	Bachelor's	Master's	Doctorate
Engineering	$57,579	$67,951	$81,344
Humanities/Social Sciences	$37,477	$45,334	$49,622
Health Sciences/Life Sciences	$40,774	$50,177	no offers reported
Physical Sciences	$50,033	$59,400	$70,095

[1]Source: 2008-2009 National Salary Survey data provided by the National Association of Colleges and Employers.


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LONDON BRIDGE STATION
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UC DAVIS CAMPUS FACILITIES MAP LEGEND

UC DAVIS CAMPUS FACILITIES MAP

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Aggie Pride is a feeling . . .

Aggie Pride is an attitude.

Aggie Pride is our history and

Aggie Pride is our future.

—Bob Foster '62, Cred. '65, M.A. '74
UC Davis coach 1971–92

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